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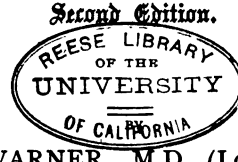
THE CHILDREN: HOW TO STUDY THEM.

A COURSE OF LECTURES.

Second Edition.



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These Lectures were delivered at the request of the Council of the Fröbel Society. 1887.

LONDON:
FRANCIS HODGSON,
89 FARRINGDON STREET, E.C.
1896.

PREFACE.

THESE lectures are addressed to all who, as parents or teachers, are responsible for the care of children, in the hope that they may help to a better understanding of them.

For several years I have been engaged in an inquiry as to the visible signs by which we may study mental states and brain-action. In these lectures I desire to present a portion of this work, and shall point out what to observe, and how to describe the facts seen. In selecting material from my MS., it appeared best to put forward that portion of the work which indicates practical points, likely to be of use to all concerned in any way with young people.

To study is to observe, describe, and think; and, in studying children by scientific methods, we may hope not only to gain useful knowledge as to methods of educating and training boys and girls, but also to train ourselves to scientific accuracy in observing and thinking.

The child and his brain-action are here studied as other living things in nature have been studied; the philosophic significance of the signs described has been fully given and published elsewhere. This work is not undertaken in a spirit of mere discussion, but as

a part of progressive scientific work which it is hoped may assist those in charge of children.

I think that much useful knowledge is likely to result from the careful and systematic study of facts seen in children. I have employed the methods here proposed for several years, both in medical practice and in frequent visits to schools. It is possible and practicable to look at the children in the school, and, without asking questions, to note the signs of nutrition, the conditions of development, and the present acting condition of the nerve-system of the children. We may observe the form and proportions of the body, the absence or presence of defects of development, fulness of form in face and limbs, the colour, &c. The nerve-system may be studied by systematic observation of the attitudes or postures, and the movements seen in the body and its parts. The rapidity and precision of movement, special movements controlled by the eye and the ear, and the like, are important signs of mental action and capacity for training. The head, face, eyes, the spine, and the arms are the parts specially studied. Such signs have been here employed in describing various conditions, such as consciousness, fatigue, rest, &c., and the facts indicated can be observed with our eyes.

Many other points for observation might be given, and may be added on future occasions; but I desire to impress a few principles, and not to weary the reader with many details.

I should be grateful to any who will communicate to me their observations on children, and suggestions for the further prosecution of this work.

F. W.

PREFACE TO SECOND EDITION.

SINCE these lectures were published in 1887, an extended inquiry as to the conditions of child-life has been conducted by a Committee; and, in conjunction with other medical men, I have had the opportunity of examining 100,000 children individually in schools. The Committee has recently published a Report with Recommendations as to Education and Training.

I have thought it well not to alter the text to any great degree, but it has been revised throughout, with some additions, while further illustrations have been inserted.

The concluding chapter is entirely new, and gives an account of recent investigations. A large amount of information which cannot here be given will be found in the Report referred to.

The work is republished in the hope that it may further stimulate the growth of child-study on scientific principles; and aid teachers and others in giving descriptions of the children under their observation, as well as afford practical suggestions for the building up of child-character.

F. W.

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LIST OF ILLUSTRATIONS.

CONTENTS.

LECTURE I.

LECTURE II.

LECTURE IV.

LECTURE V.

THE CHILDREN: HOW TO STUDY THEM.

LECTURE I.

THE CHILD AS WE SEE HIM.

IT may be presumed that we are all interested in obtaining knowledge as to the best methods of training children, and of so dealing with them as to encourage and help on the development and growth of their moral and mental faculties, in order that after some years of training they may pass out into the working and struggling world, fitted as best we can make them for the duties and labours of life.

In educational work the child should be the primary consideration; it is concerning the study of children that I want to speak, urging you to observe them on every occasion, noting and thinking about what you see. In such work the teacher and the physician may well join hands. Having conversed with many teachers as to their knowledge of children, it must be confessed that some study only their faculty of producing lesson work; but many thoughtful teachers have expressed their desire to know how to

judge for themselves, what kind of child they have before them, in his bodily or physical condition, and as to his brain-power, both for school work and as a basis of future action and character, and potential mental ability. How can we judge by what we see whether the child is bright or dull? What signs should we look for as indicating fatigue, irritability of brain, or headaches, or whether he is only lazy? These are questions that much concern the parent, the teacher, the friend of the child.

Much that I have seen in schools, and much that teachers have said to me, shows the importance of defining our knowledge with exactness, and not trusting simply to what is called intuitive knowledge. That a certain amount of knowledge as to studying children in the school and the home does exist among us there is no doubt, but it needs to be collected, defined, and systematized. Knowledge of children is power to the school manager or teacher; but, to be available, the knowledge must be definite and precise.

Many who have the charge of young children, as well as those of us who have children of our own at home, are anxious fully to understand the little ones, in order that we may the better fulfil the educational duties which we have undertaken; and we know how difficult it is to understand the exact condition of the children and their mental characteristics.

There are many different points of view from which we may study children, many lines of thought may be followed in this matter; the method I would urge upon you in this course of lectures is that of systematic

observation—that which I want you to study is that which you actually see, apart from any inferences you draw from facts; it is most important in scientific work not to confuse what you see and what you believe to exist. Let us study the child as we see him with the best powers of our mind, and careful, earnest thought.

In the course of these lectures I may sometimes speak very dogmatically, stating that such and such things are the results of certain causes, without giving any reason for the assertions. I must ask you to accept these statements, as it would be impossible for me to enter into details in a short course of lectures.

Children may be studied in many ways—we may read about them and think about them; we may study the results of their work at school, or the methods by which others teach and train them. We may study books on physiology, which show how the circulation, digestion, and respiration are carried on. We may study the structure and uses of the organs of special sense, their connexion with the brain, and how they influence its action. All such studies are of value to you; still there remains the question, "How may we, as individuals interested in children, best study them for ourselves?"

In speaking of my own methods of examining and studying children, it is with the full acknowledgment that other means may be used; but it is my purpose to speak of what I have seen, and the methods employed in reporting on one hundred thousand children I have had opportunities of examining in one hundred and sixty-eight schools since writing the first edition of

this work. These methods I was gradually led to systematize in my own studies, and I have used them now for some years; they are founded upon scientific and physiological facts, and necessitate observing individual children, and thinking about the facts observed. Such mode of study requires that facts shall be observed by you, recorded, and thought over; still, be not discouraged—a little steady practice will make all easy, and the effort will, I think, teach you much, give pleasant study, and place a real power in your hands.

It will at once be obvious that the facts we are to observe must be physical facts—we cannot directly observe the action of the child's mind with our eyes and ears; but we can observe the child's body, its make, its movements, and the signs of its nutrition; these can be seen and recorded in words; they can be thought over and studied.

To observe children with success, we must learn what to look at in an individual child, and how to describe what we see. To know how to describe what is seen is almost as important to our purposes as to know what to look for; such descriptions aid our memory; they enable us to compare observations, to think about them, and to see their meaning.

When we proceed to study a child, we look at him and observe his body, and note his height, the separate features and the head as a whole, his colour, and the movements and action in the child. It is necessary to observe such facts before we try to determine their meaning and their causes; hence I shall say more about the description of facts that may be observed

than as to their meaning; you must, to some extent, learn for yourselves the significance of the signs seen.

There is an average height and weight for children at each time of life; these averages have been determined and recorded. Mr. C. Roberts' book* on Anthropometry gives these proportions in detail, and his printed schedules have been used in some schools by intelligent teachers. Looking at the hair and the eyes, we note their colour—this is due to pigment in their structure; looking at the face and neck, we notice a light or dark complexion, which, in as far as it is fixed, is also due to pigment. In the face we may see variations in colour due to the amount of blood circulating in it from time to time—thus the cheeks and lips may have a full colour or be pale; look also at the ears, as well as under the semi-transparent nails. In a healthy, robust child the colour is due to the active circulation of red blood; the fixed colour is due to granules of pigment in the skin itself.

We now pass on to speak of the parts of the body—the head, trunk, and limbs; each of these divisions of the body consists of smaller parts, which will be briefly described. It is important to understand something on these points, because we shall have to describe the movements of various parts.

In observing a child, we have his body before us, we must look at it carefully, and try to describe what we see, not what we think we ought to see. Study and

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* "A Manual of Anthropometry." Mr. Charles Roberts, F.R.C.S. 1878.

describe for yourselves the child as you see him while he is present, and think over what you have seen afterwards.

It is best to look at the child from two points of view, so as to see him full-face and in profile—different outlines of the head and face are thus seen; it is very desirable that such observations be made in a good light.

The head consists of the bony skull, the upper part of which forms the brain-case. The eyes are set in two sockets or cavities in the skull, and are moved by muscles. The lower jaw is a separate bone jointed to the skull, so that it can be moved by muscles in eating and in talking, &c. The face is composed of a layer of many small muscles placed in front of the skull; this layer is covered by fat and skin. It is these muscles that produce expression in the face when acted on by the brain above. In a well-developed child the head circumference at nine months old is 17·5 inches; at twelve months, 19 inches; at seven years, 20 to 21 inches. You must not, however, expect always to find the head as large as here given, even in normal children; but after three years of age a head-circumference of 19 inches is too small. In estimating the volume of the head, first look at it; note its form, and not solely the circumference or other measurements; a further idea of its volume may be gained by placing your hand on the head with your fingers open. Heads may be too large or too small; the forehead may present a lump on each side, or a ridge down its centre; it may be shallow from above downwards, or narrow laterally. These defects of the

head are of great importance, often being accompanied with a tendency in the child to be thin, delicate, and dull; much depends upon how he is treated at home and in school.

The trunk or body has a bony framework, of which the spine is the main prop or support. The spine consists of a number of small bones united by pads of cartilage or soft material, which allow of a certain amount of movement in the column formed by the bones, so that the spine can be bent to some degree forwards, and backwards, or laterally. The skull is jointed to the top of this column. Some children are small and short for their age, and many of these are small-headed as well as small in body; many of these children have had rickets in early life, indicated by bent legs and a narrow, pigeon-breasted chest; rickets is largely due to feeding babies with bread and other farinaceous food in place of milk; it often leads to stunted growth, a badly-made head, and a dull pupil.

The upper extremity consists of the blade bone or scapula, placed over the back of the trunk; the collar bone or clavicle stretches horizontally from the scapula to the breast bone and helps to keep it in its proper place; and the arm is hung from this blade bone. The upper arm contains the bone called the humerus, jointed at the shoulder to the blade bone. The fore-arm has two bones—the radius on the outer or thumb side, and the ulna on the inner side; these two bones are jointed to the humerus at the elbow, and allow of two kinds of movement. The elbow can be bent, or, as we say, flexed, and it can be straightened or

extended; a rotatory movement of half a circle can also be performed at the elbow. When the palm of the hand is brought forward or laid upward, the forearm is said to be supine, and this movement is called supination; when the back of the hand is brought forward, the movement is called pronation. These rotatory movements at the elbow are due to movements of the radius on the humerus.

The wrist is composed of eight small bones, and this joint allows of movements in all directions.

The hand has four fingers and a thumb, spoken of collectively as the digits; these are united to five metacarpal bones, which form the palm of the hand and are jointed at the wrist. The palm of the hand can be moved at the wrist in flexion or extension as well as laterally; it can also be contracted or screwed up by bringing the bones together so as to form the hand like a cone. The digits can be flexed or extended, and they can be moved laterally.

These parts have been particularly mentioned because we are concerned with their separate movements. When we look at a child we see these parts clothed with their muscles and soft tissues, and covered with skin; we observe the members, their form and proportions, and in some degree we judge of the development and state of nutrition of the child by such facts.

Physiognomy is defined by Lavater as "The art or science of discerning the character of the mind from the features of the face." Such modes of study include notice of the proportions of the head such as

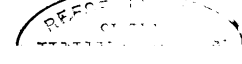
the following: the height and width of the forehead, or its narrowness from temple to temple, and shallowness from the hair margin to the eyebrows; the greatest circumference of the head, which is something like 21½ inches at eight years old, the measurement from ear to ear over the vertex being about 12 inches. The greatest transverse diameter of the skull in a child is behind the ears; and the outline of face and head as seen full-face should give the greatest transverse diameter high up, well above the cheek bones in the part forming the brain-case. The facial angle is seen best in profile.

The colour, length, and growth of the hair are noteworthy, as well as its arrangement.

In observing the face the separate features must be described—the eyes, ears, nose, mouth, and lips, the forehead, the position of the cheek bones, the chin, and lower jaw.

The forehead may be shallow, the surface covered with a fine down, the hairy scalp nearly meeting the eyebrows at their outer angles. The openings between the eyelids may be too narrow; the transverse axis of the openings should be horizontal—in place of this they may slope outwards and downwards; the size of the openings may be too small.

The mouth, as seen when the face is at rest, may be too small; this often accompanies small eye-openings. There may be an appearance of great width between the eyes, which, in some cases, is due to a fold of skin, continuous with the lower fold of the upper eyelid, placed across the inner



angle of the opening; it is called an *epicanthic fold.*

The bony nose may be wide, sunken, or indented. This is not unnatural in very young children, but when it persists to the age of eight or ten years is often accompanied by defect of nose and throat, leading to deafness, and calling for medical treatment.

The face as a whole may be small, including the upper and lower jaws, and that independent of the size of the upper part of the head which contains the brain. The features may be coarse, heavy, flat, and lips thick. The features may be large and ill-proportioned. The separate features may not be individually malformed, but disproportionate one to another, or to the size of the face; thus the nose may be small, the face large, round, flat, the features rising from the plane of the face. The lips may be thick and protuberant.

The external ear is often defective in its size, form, or parts, especially in boys. The ear may be outstanding, with great convexity behind, and cave-like in front, in place of lying flat against the head. The rim of the ear, or the pleat in front of it (antehelix) may be absent; the skin of the ear may be tightly stretched, coarse, red, and liable to chilblains. Such defects have no necessary connexion with dull hearing.

The movements and mobile expression of the face will be described in Lecture IV. The outward appearance of the body or the passive expression has been studied from ancient times, and much has been written on the subject. The laws of form and proportions of the body have been laid down by many

authorities who differ much among themselves. Such studies have been undertaken from the philosophical and artistic points of view rather than as a part of the study of physiology.

As you look at children, observing their form, you will see some with a shapely, well-cut head of good size, while others are ill-shapen or small; the features may be defective, and as such show us signs of faulty development. You may desire definite directions as to what may be considered the standard of excellence in the development of the head and body. I cannot give you such definite instructions, but will advise you how to obtain a general knowledge as to the signs of perfection for yourselves. At every possible opportunity observe the outline, form, and size of people's heads, paying special attention to the points mentioned; study the physiognomy of children and persons known to you, and draw your own conclusions as to the value of your observations.

Study also well selected art representations of the human figure, in rest and in action, and learn from them the rule of perfection. In some schoolrooms, photographs, engravings, and casts of the best antique statues are to be seen. I wish it were so in all cases, that we might learn from those who have long observed the human body what is excellent in form and outline, as well as graceful in movement and attitude.

Much has been written on the subject of physiognomy that may interest you. Compare the writings of Lavater, and those who followed in his steps, with the later work of Sir Charles Bell on the "Philosophy

and Anatomy of Expression." The knowledge and the methods of the two authors differ. Lavater described the size and form of the head together with the character of the man—he did not know the signs of brain action; he observed the immobile signs—we shall see their significance presently. Sir Charles Bell described not only the anatomy of the brain and nerve-system, and the muscles which produce movement; he showed that the brain by its action, as it sits hidden from view in the skull, sends out currents of force to the muscles all over the body, producing those movements which we call mobile expression. Bell showed, further, that currents are constantly passing from the surface up to the brain, guiding and controlling its action.

We want to study the signs of brain action—you will ask what is the connexion between physiognomy and brain action? As to the size of the head in connexion with the brain, it is certain that the brain can be no larger than the bony case which contains it, and the brain is often badly made when the skull is badly shapen; we shall see more about this further on. Experience shows that when the head and features are badly shapen the brain is often, but not necessarily, poorly developed. Defect in physiognomy and, in proportion, of the parts of the body is often associated with mental dulness, but the occurrence of brain disorderliness, indicated by abnormal nerve-signs (incoordination), is a more general and direct cause. It should then be an object in training children to remove their nerve-signs or irregular or bad modes of

action in movements which are the direct indications of brain state. This subject will be dealt with later on. The most important signs of brain action that we can observe are the movements which it produces in the body. It is by observing the action and the attitudes of the child that we find means of describing its brain condition; such signs we shall study in Lectures III., IV. The signs of brain action, and the most valuable signs of its condition, are the movements and results of the movements which it produces in the parts of the body; these will be described in the succeeding lectures. It is of great importance clearly to understand the difference between the two modes of expression—passive immobile expression indicated by the size and proportions of the head and other parts, and the mobile expression or movements which are the direct outcome of brain action upon the muscles. The most important signs of brain action are the movements, and results of the movements which it produces, such as the postures and attitudes of the body and speech; they are the direct outcome of brain action, and can be observed and studied by all.

A boy attending a Board school was brought to me by his mother because he was troublesome, did not do his work, and was always in disgrace and punishment, and she did not know what to do with him. I observed at once that he had a cleft upper lip, which had been closed by a surgeon, but the scar remained. Knowing the frequency of several coincident defects in the same child, and that the brain in such cases is often but not always badly made, I examined him

with care. The boy had a defect of his heart, and his brain was ill-developed. Advice was given that he should continue at school, and that the teacher should be informed as to his condition, that he might be kindly treated, and not expected to pass examinations. This boy has a right to the benefits of education; they afford the best chance of his improvement, and of preventing him from becoming a failure in life. Such cases are common; illustrative examples will be given in the sixth lecture.

After looking at the child to see the signs of his development, we want to determine his probable condition at the time we see him. The signs of the general nutrition of the body are important, and may well be considered here before we deal with the child in action. His plumpness, fat, and colour are the most obvious signs: a caution must be given—the face may be fat while the limbs and body are thin; hence I generally feel a child's arm and look at his legs. When you note the colour of the lips and skin, as signs of general nutrition observe also the hair and the eyes; when these are dark it is owing to the amount of pigment in these structures, and then the skin is usually darker in its tint. Observe whether the colour comes and goes; such changes are due to the action of the nerve-system on the blood-vessels. If there be permanent paleness, it may be due to a poor state of the blood, called anæmia; then the child is out of health. A pale child may flush much. Defective colour may be due to ill-feeding, to living in rooms badly ventilated, hot and close, or too dark.

A southern aspect is very desirable for children's rooms.

We shall have much to say hereafter about the signs of mobile expression, but, before we pass away from the study of the body in its immobile or passive condition, a few more words may be said as to the means of training the eye to recognise the perfect outline and form, and to observe any slight departures therefrom. For the purpose of training your eyes to appreciate perfections of form and accuracy of movement and balance, so that any deviations therefrom may be readily observed, use your powers of observation at every opportunity, observe your friends and acquaintances and all round you; specially observe children according to the rules laid down; try to form a general opinion in each case whether they be intelligent and well-bred children, then describe their form for yourselves as best you can, and fix those examples in your memory that are of high-class type; go into schools in poor districts, and study the less well-born children. The types of perfection of form should be seen in art—they are seen in much of the antique and in some modern statuary; works of art may thus be useful to you. To study perfection and beauty of form you should contrast the most perfect with the least perfect—examples of low development in contrast with more perfect productions will throw much light upon your studies; the contrast of marked perfection with imperfection throws each into greater relief and prominence. Leonardo da Vinci, we are told, searched for ugliness.

In all that may be said in these lectures I want to help and encourage you to observe for yourselves, and this for several reasons. Continuously observing gives a pleasant personal interest to the observer, and all who have charge of little children need intellectual encouragement and help in such work. To give descriptions of what you see in the children will add accuracy to your observations, and enable you to classify them, and to record their progress in relation to their mental and bodily power; further, it will give you knowledge of the utmost use as a basis of physiological psychology, and add power and dignity to your professional work. Parents also see their children, though they may in some instances study their minds less than you do, and look at them from a different point of view—a common link between you may be the child as we see him; people believe what they see. The observations you make for yourselves will be of more use to you than facts that have been observed for you, or that you have heard or read of, and the personal effort will give you a deeper and truer insight into child-mind and its dependence on brain action than anything that can be taught to you. Lastly, I much hope that in a little time we may benefit much in our scientific work by the record of your experience, and that knowledge of high social value may result from our joint efforts for the children. The parent, the teacher, and the guardian of the child will study him not only for his body's health and development, but also for the sake of helping and understanding his mind, and his capacity for the development of moral

and intellectual faculty. This is my own desire, this has been the animus of much labour during several years, the outcome of which is now offered to the children through you.

The methods by which we here proceed in our studies of children are those of physical science, the same methods as we use in studying physiology, botany, chemistry, or physics. We therefore here make the same primary assumptions as in other scientific work: we assume that every physical fact has a physical antecedent or cause, and that every movement we see, and every result of growth or movement, are effects of physical causes. We do not say that the child is a mere machine—it is not so; but we do say that his movements are produced by physical causes, and that they are within the domain of scientific study.

Now a few words must be said about eye conditions in children, though time will not allow me to enter into the details of so wide a subject. Teachers ought to know the signs of those manifest diseases of the eyes which make the child unfit for school life, and call for prompt application to the doctor; this especially applies to ophthalmia, which is very destructive to eyesight and highly contagious. Many cases of defective eyesight are due to "short-sightedness," and these might be found out by periodical examination of the children by the master of the school. Mr. Priestly Smith* says: "It is the simplest thing in the

* Lectures on Health: "Eyesight, and how we lose it." By Priestly Smith, Esq. Hamilton, Adams, & Co., 32 Paternoster Row.

world, and would not take half a minute for each child. A set of test letters is hung on the wall; a line is drawn upon the floor at a certain distance from it; each child in turn is made to toe the line, and to read the letters. Any child who cannot read the letters has a defect of sight of some kind or another."

There are other defects of eyes which may produce headaches in children, and are remediable by spectacles.

LECTURE II.

ORGANIZATION AND FUNCTIONS OF THE BRAIN, AND THE SIGNS OF ITS ACTION.

IN the first lecture we studied the child as we see him, looking at the external parts of his body while at rest in the passive state, and certain signs were described which you may observe as indicating good development, or defects in the development, of the body. It was shown that, when defects are seen in the features or parts of the body, there is often coincident defect in the organization or make of the brain.

We now pass on to consider the brain itself, its functions, and the signs of its action. The brain is a part of the body hidden from our view, and enclosed in its bony case in the head. The brain of the child is carefully protected from injury, being surrounded by delicate membranes and a slight layer of fluid; it is well supplied with blood, which circulates and supplies it with needful nourishment. Important as the functions of the brain are, and much as we desire to study its action, there is only one way in which we can watch the effects of its working, and that is, by the movements which it produces in the parts of the body by its action on the muscles. All movements in the body are produced by the action of the nerve-system upon the muscles: this is very

portant to remember. Hence we shall have much to say about movements, the outcome of movements, and mobile expression as signs of brain action, and the brain condition.*

It may occur to you that, as much has been said by physiologists about the connexion between the mind and the brain, we might study mental action as signs of brain action. Let me make an assertion, and then support it by illustrations. *All expression of the action of mind is by movement, and the results of movement.* A child is at lessons, he repeats what he has been taught, accompanied by gestures or movements; his speech is produced by the *movements* of his chest, larynx, and the parts used in articulation. The written exercise is the outcome of the *movements* of his hand acting upon the pen. His intelligence may be shown in a game, in the house he builds with his bricks, or in the paper-folding which he does so neatly with his fingers; in all such cases the signs of the action of mind are the *movements* produced by the brain.

The general condition of the nerve-system is expressed by motor signs—freshness, fatigue, irritability, may all be indicated to us by the movements of the child, the absence of movements, or by the attitudes or postures of the body which depend upon motor action. Examples will be given in Lecture V.

The expression of the emotions is by the action of the brain upon the muscles of the body, and their contractions produce the signs which indicate to us

* See author's work on "Anatomy of Movement."

what are called the emotions of the mind. We shall in these lectures study movements produced by the brain, not mind itself, in the child.

A few words may be said as to the structure and modes of action of the brain; then we shall proceed to describe the signs which we can see as indications of its functions and its condition.

The brain is a soft and delicate structure, seated in the brain-case, and carefully protected; it consists essentially of two kinds of material, the nerve-cells and the nerve-fibres. The nerve-cells are the makers of nerve-force when duly nourished; for their proper nutrition they need a good supply of blood in their vessels. A nerve-fibre passes off from each cell and conveys the force generated in it, which is then called a nerve-current; there are millions of such cells in the structure of the brain. When the nerve-force generated by a nerve-cell is carried by a fibre to a muscle, say in the face, or in the limbs, this nerve-current causes the muscle to contract or shorten, and visible movement results; the movement being produced by the force sent from the nerve-cell. The movement seen indicates to us the time and quantity of the discharge of force from the nerve-cell; such movement is conveniently called a nerve-muscular movement.

The substance of the brain is thus mainly made up of groups of nerve-cells, many of which are connected with one another by nerve-fibres, and many of them are connected with the muscles of the body, and send nerve-currents to them, thus causing the movements of the members. The nerve-cell generates force as

the outcome of its nutrition, and may be compared to a galvanic cell which generates electrical force as the outcome of chemical action taking place in it. The electrical force formed in the galvanic cell may be conducted to a distance by a wire, and, if this end be connected with a galvanometer, it may produce movement of its needle at a distance from the battery. If several electrical cells be connected together in series by means of wires, the force generated by one cell is communicated to the next, and increases the strength of the current circulating in the wire that passes off from the battery; this force may be distributed to parts at a distance from its origin.

As time goes on, the strength of the battery will run down, the chemical action in it lessens, the material in the battery is used up, and no more force is sent out till the materials in the cell are renewed. Similarly: while the brain is giving out force, it must be replenished by nutrition, or it will run down and be less capable of producing energy after a short time; it will then need food and rest, and the stimulus which aids brain nutrition.

I have spoken of the nerve-cells of the brain as being connected with one another, and with the muscles of the body which produce movements of its parts. It must now be explained that there are other nerve-fibres which connect the organs of special sense —the eye and the ear, &c., and the skin all over the body—with the cells of the brain, and convey currents of force from these parts, respectively, to the cells of the brain; such nerve-fibres are called *afferent*, because

they convey currents upwards to the nerve-system ; in distinction from these, the fibres which convey currents from the nerve-cells to the muscles are called *efferent*. The fibres which pass in both directions are collected into bundles or strings, and are commonly called the nerves of the body; the in-going or afferent nerves convey stimuli to the brain, the out-coming or efferent nerves carry motor currents from the nerve-cells to the muscles.

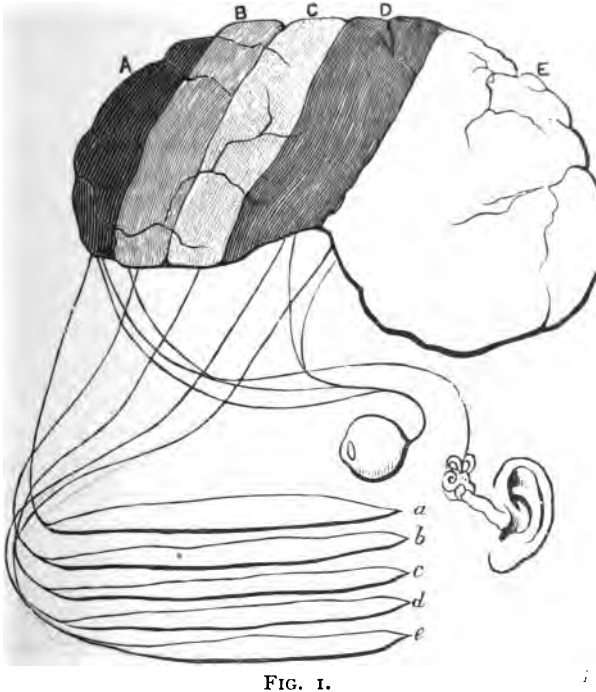


FIG. 1.

Figure 1 may explain further what has just been said: the brain is represented by the shading as divided into areas *A*, *B*, *C*, *D*, *E*, which can act more or less independently; each area or section of brain is represented as connected by nerve-fibres with a muscle corresponding. Each section of brain may receive a stimulus from the eye or the ear. The representation is purely diagrammatic, for the sake of clearness of description. The brain areas *A*, *B*, *C*, *D*, *E* each receive nerve-fibres carrying impressions from the eye and the ear, so that they can separately be stimulated by sight and sound. Fibres pass from each brain area to the muscles *a*, *b*, *c*, *d*, *e*, respectively; when *A* is stimulated, the muscle *a* contracts; if the centre *E* be stimulated, the corresponding muscle *e* contracts, and so for each centre and muscle respectively: the muscle is the visible index of nerve-currents proceeding from its own centre. If we see the muscles *a*, *b* contract at the same moment, that indicates that the centres *A*, *B* acted together.

If you see my arm move, you know this means that the muscles of my arm are contracting, and that this is due to currents of nerve-force passing out to them from certain nerve-cells by means of the efferent or motor nerves. Place an orange in front of a child; then you will see his head and eyes turn towards it, next his hand is moved over the orange, his fingers are closed over it, and it is seized. This series of movements is due to a series of nerve-currents passing from the nerve-cells to the muscles of the parts moving; this series of nerve-currents from the nerve-cells to the

muscles follows the impression produced upon the brain by the sight of the orange, or by the afferent currents passing from the eyes to the brain, and these are stimulated by the light reflected from the orange.

Many parts of the brain can act separately: every movement corresponds to the action of a certain portion of the nerve-system, or, as we call it, nerve-centre. It is probable that every movement indicates the discharge of force from a certain area of nerve-substance, and that such discharge of force necessitates not only a supply of good blood to that piece of nerve-tissue, but also that the nerve-tissue shall be stimulated by some force.* Stimulation is necessary to movement as well as a supply of blood to the nerve-centre; sights and sounds are the more common stimuli to movements.

Look at a child before he wakes in the morning. The body is quiet; if you raise his hand gently, it falls lifeless—no muscular energy is being expended. The body is motionless in full sleep, except for the movements of breathing, which are quiet, regular, uniform. If sleep is full and complete, on raising the eyelids the pupils are seen to be very small or contracted. The body and brain are in complete rest; in a healthy well-fed child the whole system is in the state of quiet nutrition of organic life; no currents are being generated by the brain in perfect dreamless sleep. As time goes on, you hear sounds in the house, which send currents from the child's ear to his brain; we then see some movements of the limbs—

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* See "Anatomy of Movement."

the elbows, wrists, and fingers move. Soon all is seen to be quiet again in the limbs—sleep continues, and the brain rests and grows without expending force. As sounds grow stronger in the house, and the light pours in between the opened curtains, you may again see movements in the limbs, and the eyelids open; the pupils now dilate; the brain becomes active, indicated by movements in the limbs and face, as the child sits up. Nerve-currents are now passing from the brain to the muscles. Before school he is full of movement—limbs, fingers, head, eyes, are all moving, owing to spontaneous brain activity. As he stands in his place and teacher calls for attention, we see him still and quiet (or at least that is desired), and the teacher tries to control his brain action under instruction. Spontaneous brain action will be shown to be the basis upon which you work in producing mental aptitude; it must be co-ordinated or regulated, but so as not to destroy spontaneity.

Movements may conveniently be divided into two classes—those which we observe as directly following stimulation acting on the child from without; and movements called spontaneous, which are not so clearly the direct result of stimulation of his organs of sense, but appear to be the outcome of brain nutrition. Movements following sight and sound belong to the former class. Typical examples of movements stimulated by impressions received from outside the body are seen in what the physiologist calls reflex actions. When the eyeball is touched, a stimulus is sent to a nerve-centre, with the result that a nerve-

current is quickly sent back from the nerve-cells to the muscles, closing the eyelids.

Spontaneous movements are seen in a marked degree in the young infant. Observe a healthy, well-nourished infant, say seven months old, unfettered by clothes, on his mother's knees. He is full of movement while awake — the arms, fingers, and toes are constantly moved, apparently spontaneously, or without stimulation from without; movements, apparently irregular and effecting in themselves no apparent purpose directly useful to the child, are almost constant in all the parts of the body. Spontaneous movements may likewise be seen in all young animals; and it has been shown that in seedling plants the little root, the seedling leaves, and all young growing parts are constantly moving.* Such is the universal method of Nature in young and growing creatures. We shall describe some spontaneous movements in children as signs of fatigue and other states in Lecture V.

When the infant is about three months old, we may observe some control of its movements through the senses—spontaneous movement remains as a marked character of the healthy brain; but the nerve-action may be temporarily arrested by showing a bright object; this is the earliest indication of a brain faculty that may develop into the power of attention. When *five months old*, further evidence is obtained of control of the spontaneous action of the nerve-centres through the senses; the sight of an object may momentarily

* See C. Darwin on "Movements of Plants."

stop the movements, and this may be followed by turning the head, eyes, hands towards the object seen, *i.e.*, coordinated movement; movement controlled through the eye occurs after momentary arrest of spontaneous action. When a year old, action well adapted by impressions of sight and sound becomes very marked, and the child makes certain characteristic sounds on sight of certain objects; its spontaneous brain action becomes gradually more and more capable of control.

Two circumstances are necessary in order that a nerve-centre may produce action of the muscles and movement—it must be nourished by good blood, and it must receive some stimulus. This gives us the clue as to how we must act upon the brain of the child: there are two ways—by feeding it and by *stimulating it through the organs of sense.* Brains do not grow by feeding only—they must be impressed or stimulated from without; hence the importance of good education as an aid to brain development. Let me make an arbitrary statement without giving my reasons here. Feeding the child often lessens spontaneous movements when they are in excess; fresh air may have a similar effect; various modes of stimulating a child through the eye and ear may control spontaneous movements, but these must be used with due caution. Do not stop a child's movements unless you know why you do so. You should no more wantonly arrest a child's movements without due cause than throw a stone at an animal without cause, or destroy a flower because you do not see any use in it. This should be

known by those who confine the hands and feet of little infants under bulky and cumbersome clothes. Children should have their hands free, and not carry bags and books, and should not be compelled to stand in class with their hands behind them.

In observing movements as signs of brain action, and in describing them, it is most important to note the parts moving. Movements may be seen principally in the digits, more in these small parts than in larger parts, such as the elbow and shoulder; they may be seen principally in the muscles about the mouth, or in certain other parts about the face. In any case, the movement of a part corresponds to action in a certain group of nerve-cells corresponding. Remember this physiological fact—it is the basis of much that is important in the management of children. One series of movements long continued means long-continued action of one portion of brain; change the action of the child, and you thereby change the portion of brain acting; thus you may help to avoid fatigue and exhaustion.

I spoke just now of movements of small parts of the body in contrast to movements of large parts; the fine movements of small parts more directly indicate brain action; these should not only be carefully described by the observer, but also cultivated by the teacher, as in paper cutting, folding, and similar occupations. I think the same kind of brain culture may be given by calisthenic exercises, which should be arranged not only to strengthen large muscles, but also to develop slight and independent movements of small parts of

the body, and the ready action of small portions of brain produced by imitation of your movements.

I now ask your attention to the signs indicating the brain condition of children which are probably new to you—that is, the study of postures or attitudes of the body and limbs. Such signs will, I think, be most useful to you, as they have been to me, and, with a little practice, they are easily observed and described.

When the hand is held out, the posture or attitude seen is brought about by the last movements that occurred in the parts of the hand. Postures are, so to speak, stationary results of movement; the posture is the outcome of the balance of the muscles which produce it; and this is the outcome of the balance or ratio of action in the nerve-centres which stimulate the muscles to contract. Without going into theoretical matters, let me say that postures of the parts of the body are important signs of the brain state at the time. The postures you see are most commonly due to, and are signs of, the condition of the nerve-system.

When I began to make the expression of conditions of the brain a definite study, I frequently looked at my patients, especially the children, after I had found out what their condition was, and I noted down any visible expression of their nerve condition. My attention was soon attracted to the frequent occurrence of certain postures of the body indicative of conditions of the nerve-system. It is often more easy to describe postures than to describe movements: postures are conditions of quiescence, they can be watched during a space of time; they can be drawn, photographed,

or represented by casts in plaster; movements are evanescent.

To study postures as signs of the mental brain state of the child, look at his parts and members when free or disengaged. To observe the hand for this purpose it should not be engaged in holding a pen, but be free that all the fingers may move as the brain will move them; that the brain state, not the pen, may govern the posture of the hand. The hand of a labourer* is seen engaged in digging with his spade; his nerve muscular energy is expended in holding and driving his spade. It would, under such circumstances, require a very strong nerve-current sent to those muscles to alter this forcible brain stimulus. Hence, the hand, while engaged in digging, is not very impressionable and expressive of the finer motor actions of the nerve-mechanism. When the man puts aside his spade and talks, especially if at rest, his hand gesticulates and expresses his emotions. The hand may be said to be free when it is held out at the word of command, when hanging over the arm of a chair, or when it is moving towards an object.

The face may usually be considered free to be acted on only by the brain, except when eating. When a strong cold wind blows on the face it is too strongly stimulated thereby to be very impressionable to force originating in the brain. The eyes are free when not strongly stimulated by the sight of some object, or bright light or colour.

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* See "Physical Expression," p. 144.

We have now considered three different classes of signs indicating the condition of the child: the form and proportions of the body and its parts; the postures or attitudes; and the movements of parts. Of these, movements are the most important signs, though the most difficult to record on account of their temporary character.

Defects in development of the body are frequently accompanied by a dull brain: they are more common in boys than in girls. Of the children with such defects, the teachers reported 38 per cent. of the boys, and 41 per cent. of the girls, as dull or backward in lessons. The relation between "defect in development" and mental dulness finds some explanation when it is said that of these children 54 per cent. of the boys, and 49 per cent. of the girls, showed also the awkward or ill-balanced kind of brain action indicated by the "nerve-signs" that will be described in the next lecture. This shows how important it is in dealing with dull children to train them by the use of physical exercises to move with exactness and precision. I have found that in schools with good physical training the teachers had fewer dull pupils to report.

It will be shown that children with "defect in development" are also often pale, thin, delicate. This statement involves the fact that delicate children often have more need than others of good teaching to prevent them from growing up mentally dull. Defect in development of the body and "nerve-signs" are both much associated with mental dulness; but the

nerve-signs are more largely and directly associated with the causes of dulness; they can, to a great extent, be removed by appropriate management of the pupils—and this should be an aim in school-training.

Finally, let me direct your attention to the importance of observing symmetry or asymmetry of postures and movements; we shall see some examples in the next lecture. Equal power and equal action of the two sides of the brain usually mean a higher condition of strength than asymmetry.

LECTURE III.

THE ARM, THE HAND, AND THE SPINE.

WE shall now consider the signs of brain action that may be observed in the body, commencing with the upper extremity, and we must enter into many details illustrating the principles of study given in the first two lectures,

The upper extremity is composed of parts which have been described. It is in a very direct manner under the control and guidance of the brain. The nerve-centres which produce its movements are very easily stimulated by the currents passing up from the eye and the ear. Postures and movements of the hand are very expressive of the condition and action of the brain and of its mental function. The hand may be an index of the condition and action of mind.

When we wish to examine a child as to the condition of his nerve-system, we may request the child to stand up and hold out his hands with the palms down, spreading the fingers. It may be necessary to explain to him first what the palm of the hand means, and to show him the action momentarily. It is desirable that you should use the same word of command, the same stimulus to action, on all occasions. This action of the child is convenient, leaving the arms and

hands free, and ready for your observation and description. It is desirable that the upper extremities, when thus under observation, should be free and unoccupied; they must not be engaged in doing anything. If I hold this lump of chalk in my hand, it is not free to express the condition of the brain. Clasping the hand on the chalk is partly a reflex act following the pressure of the chalk; only in part is it due to the direct action of the brain upon the muscles of the limb.

If you see the hand of the child thus occupied, and you wish to observe it as a sign of brain condition; either cause the hand to drop what it holds, or wait and watch for the favourable opportunity for your observations when the spontaneous action of the child shall set the hand free. The hand may be free when passing to reach an object, not so when it has seized it; it may be free when hanging over the arm of a chair, less so when resting on the table.

In observing a child, I would say to him: "Put out your hands with the palms downwards, and spread the fingers." The movements and balance of action in the parts of the arm can thus be seen under favourable circumstances. A strong and healthy child, say of five years old and upwards, will hold out his hands fairly straight with the arm and shoulder; the limbs may not be held quite at the same level—the left is often a little weaker and is held a little lower than the right. The typical sign of strength is that the hand be straight extended, as in Fig. 2, the fingers straight with the metacarpal bones and the forearm and shoulder; the palm of the hand, or metacarpus, straight, not

contracted laterally, as in the feeble hand (see Fig. 3); all parts are in the same horizontal plane; the arms should be parallel to one another, straight at the elbow, and both on a level with the shoulder. A slight deviation from this rather stiff and exactly balanced position is not to be considered necessarily a departure from health; however, the posture above described is the standard of the normal, and indicates a robust, well-balanced nerve-system.

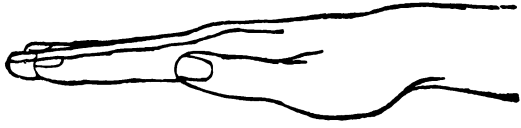

FIG. 2.—STRAIGHT HAND.

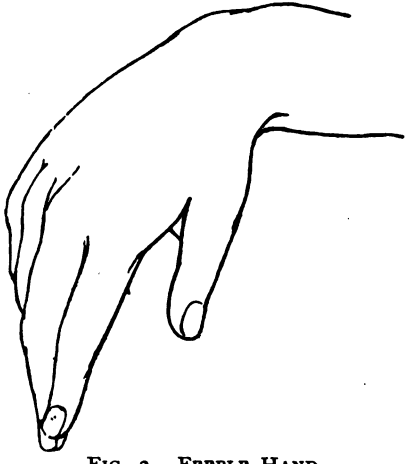

FIG 3.—FEEBLE HAND.

Looking at a body of children, say in the third or fourth standard of a primary school, you will see, perhaps, 5 or 10 per cent. of the children who do not present this perfect balance and typical posture. The appearance of certain deviations from this standard of the normal marks the child to me at once as probably nervous, excitable, or exhausted. The observation of certain groups or signs tells us something of the character or kind of child and his tendencies. It may be a matter of interest and importance to those responsible for children to look at them, study them, and observe the presence of signs which indicate their present condition and probable tendencies in future development.

I am going to speak of what you may observe in looking at the hand, the arm, and the spine, and I shall say something as to the significance of such signs. In thus trying to give you such knowledge I must warn you not to be too dogmatical or rash in expressing an opinion upon a few signs only, especially as I must here give them in empirical form—their fuller meaning you must look for elsewhere.*

Among a large body of young children we may see many presenting awkward attitudes far departing from the normal type of strength ; the form and proportions of the body may also be defective in the same children. These unusual attitudes are due to want of balance in the action of parts, a state of growth often accompanied by a want of due proportions in the

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* See "Anatomy of Movement."

growth of the parts of the body; nervous weakly children are often too tall and thin.

It may possibly add some interest to our work if I explain how my attention became directed to the study of postures as signs of brain conditions. Having during some years given special study to the conditions of the nerve-system in children, I began to note the various postures presented by children brought for examination at the Children's Hospital, and from 1878 I kept notes of the spontaneous postures observed. The children were requested to hold out their hands, and the passive condition or posture of the hand was noted. At first it was difficult to describe the posture seen in precise language, though some were seen to be characteristic of certain nerve-conditions. In 1879, while visiting Florence, it struck me that the posture of the hands of the Venus

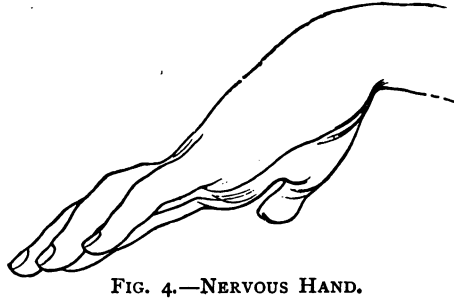


FIG. 4.—NERVOUS HAND.

de Medici was exactly similar to the posture I had so often seen in nervous children. Later, at the British Museum, I saw the English Venus side by side with the Diana (Fig. 5), feminine coyness and nervousness repre-

sented side by side with the expression of energy and strength, and the contrast of the hand postures showed them to be in direct antithesis. While looking at the

FIG. 5.

marble hands it became easy to describe their postures in precise language. In the hands of the nervous

woman, the wrist is slightly flexed or bent, the knuckles are moderately extended back beyond the straight line, the finger joints being slightly bent. The thumb is extended backwards, and somewhat drawn away from the fingers. This posture I have called the "nervous hand"; it is that so commonly seen in weak, excitable, nervous children, such as are hot-tempered but affectionate, tooth-grinders, and very liable to recurrent headaches. Here is the cast of a hand carved by Canova, an art-model of beautiful workmanship. This hand represents exactly the nervous posture. Art often presents us with the expression of weakness in place of strength, beauty in place of perfectness.

In the Diana of the British Museum we see the figure of a strong energetic woman. Our common

FIG. 6.—ENERGETIC HAND.

experience tells us that it is such. Her right hand is lifted, and is engaged in holding a spear or dart which she is about to hurl; this hand is therefore not available as a sign indicating the mental condition. The left hand, however, hangs down, and is free or

unoccupied, and by its posture affords us evidence of the active or mentally energetic condition of the brain. The balance of the parts of the body indicates to us the balance of the action of the nerve-centres. This is the posture termed "the energetic hand" (Fig. 6).

The wrist is extended backwards, the fingers and thumb are flexed.

If we compare this energetic hand with the hand in the nervous posture, we see the former to be the direct antithesis of the latter. In the weak woman the hand is flexed at the wrist, the fingers and thumb being bent back at the knuckles; in the strong woman the wrist is extended backwards and the digits are flexed. This is an example of one posture being the antithesis or direct opposite of the other; Mr. C. Darwin made much use of the principle of antithesis in his work on Expression.

I have described the straight extended hand as the normal type, and two postures as deviations therefrom: one, the energetic hand, a perfectly normal and healthful condition; the other, the nervous hand, which indicates weakness and excitability. An example of the energetic hand in real life may often be seen in the attitude of little children, say between three and four years old: you call them to come to you, and show them something they like; they run with arms stretched out and hands in the energetic posture, the wrist extended, and the fingers slightly flexed.

An incident which happened the other day may serve to illustrate the value of studying postures as signs of the nerve-condition. I was asked to observe

some young people, and noticed three in whom the hands, when held out free, showed the wrists flexed with the knuckle-joints extended backwards. I immediately pointed out to the teacher that they showed some signs of nerve-muscular excitability; the correctness of this opinion I was afterwards able to confirm.

One of the first departures from the signs of perfect strength is the posture we are about to describe under the name of "the straight hand with the thumb drooped."

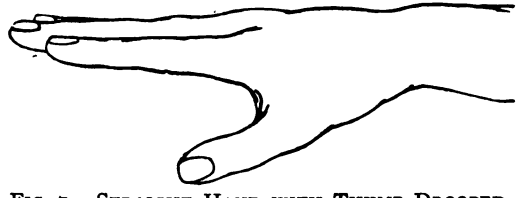


FIG. 7.—STRAIGHT HAND WITH THUMB DROOPED.

This may commonly be observed in conditions of health when fatigue or slight weakness occurs. It is similar to the straight hand, but the thumb, with its metacarpal bone, falls slightly, thus approximating the latter towards the palm. I was once able to point out this sign to the headmaster of a large school. I had looked over the lower classes of the school without noticing any unusual signs among the boys. When, however, we came to the first class, and these boys held out their hands, I observed that every boy, with two exceptions, held the hands straight, with the thumbs drooped. This class had recently been engaged in their annual examinations.

If you notice people's hands, you will often see that early in the morning the hand is held quite straight;

while in the latter part of the day the thumb tends to droop. In such cases, food, and a little rest, will usually restore the normal posture, and this, the first sign of fatigue, will pass away. This posture is, in fact, the first stage towards the feeble hand which we shall soon describe.

Here is a cast which shows the natural position of the free hand when at rest, as it may be seen hanging over the side of a chair, or lying in the lap. The hand in rest is a natural position, with slight flexion of the wrist and fingers, and slight arching of the metacarpus or palm of the hand. It is also common in slight

FIG. 8.—HAND IN REST.

fatigue without exhaustion, and may be seen in healthy sleep, when no energizing nerve-currents are passing from the brain to the muscles. If you are in doubt as to whether a child is asleep, raise the arm by the wristband and let the hand free; if the child be asleep, the hand will assume the posture of rest.

The "feeble hand" is an exaggerated form of the "hand in rest." The degree of flexion of all parts is greater, and the metacarpus is much arched or contracted. This is seen in conditions of exhaustion.

Two typical postures of the hand still remain to be described. The "hand in fright" is a posture not often seen; it is a modification of the energetic hand, the wrist and fingers being all extended. It is well

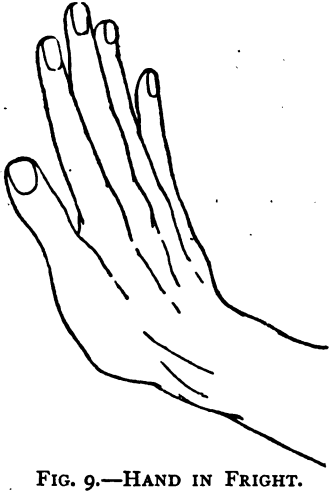


FIG. 9.—HAND IN FRIGHT.

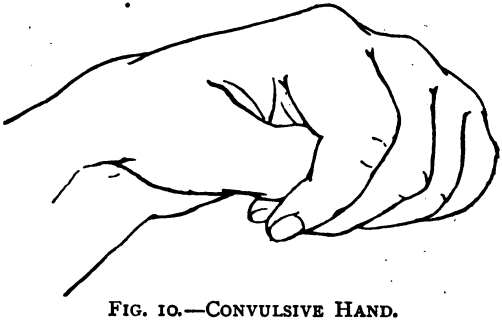


FIG. 10.—CONVULSIVE HAND.

represented in the statue of Cain (Fig. 11) and in several members of the Niobe Group at Florence.

FIG. 11.

Here I have a cast of the hand of a child who was in a convulsion, and the typical posture is called the

"convulsive hand" (Fig. 10). The thumb is strongly flexed on the palm of the hand, while the fingers are closed over it, thus forming a closed fist, while the palm is arched or contracted by bringing its sides together. This position is never normal, but in a few cases may occur as a simple matter of habit. The convulsive hand may be seen in a child in passion, and it sometimes occurs during a strong effort of self-control, and I have often seen it in people when about to have a tooth drawn.

These eight types of hand postures will help you to describe what you see, but various deviations from these types will often occur.

While observing a child you may describe his postures and his movements; in speaking of the latter, the part moved and the direction of its movement must be noted. When the child stands up and holds out his hands, it is well to get both a full-face and a profile view; there may be slight movements in the fingers. We have already spoken of the incessant and spontaneous movements of the infant, and these to some extent continue during the early years of life. The finger movements may be in two directions—they may be in flexion and extension, or they may be lateral; these latter are the most important as indicating irritability of brain. The flexor-extensor movements can be seen in the full-face or in the profile view; the lateral movements of fingers are best seen when in front of the child. In looking at movements of the digits, note whether the separate parts move together or not; the constant repetition of one series

of movements is often very senseless. In nervous twitching it is more common to see one or two fingers only moving.

In looking at the upper limb as an index of the brain we may observe postures and movements; practice in observing these will teach you much as to the nerve-system of children. It is my work to point out what you should look for, to define certain typical conditions, and explain their meaning in some slight degree, but you can learn much more than this by practice and observation.

In making such examination of a child you may find response in action defective. Response following a command, or in imitation of your movements, may be accurate or uncertain, prompt or slow. There may be an interval between the command and the response, or the action may be continued unduly long. Response may be better stimulated through the eye than through the ear; hence children often learn good action from imitating one another.

You must observe many children of various ages, under varying circumstances, to form an idea for yourselves as to what amount of movement is indicative of health. This you must study for yourselves just as you would try to learn how much mental work a child is capable of. Observe and study these points; in these matters there is no rule, except that derived from personal observation. Looking at the arms of the child, observe the hands, wrists, elbows, shoulders, on either side; look not only to the postures, but also to the movements. Postures and movements may be

alike on either side, or they may be asymmetrical; you will find it not uncommon to have several signs of weakness on the same side of the body. When the two sides of the body do not move alike, it is commonly due to the diminished force or energy of brain, as seen in a tired child who leans on a table or chair.

Asymmetry of the postures of the body is usually accompanied by a slight tendency to lateral curvature of the spine. Postures of the spine are well worthy of study. As I have shown you, the spine is a column composed of many small bones, and is capable of being bent in various directions. Lateral curvature of the spine may be suspected if a child, when at work, constantly bends to one side, making one shoulder higher than the other. This may be due to weakness, and may be accompanied by finger twitching, and weak hand-postures unequal on the two sides. Stooping, or lateral bending of the spine, may be due to short sight or other eye defects, which should be looked for in such cases. When you notice a child bending over his work, get the test-type and examine him for short sight.

There are forms of weakness and fatigue indicated by weakness of the muscles of the spine. Take a weakly child of seven years old; let him stand with heels together, head up, and hands by his side. Observe the child in profile, so as to get a view of the curves of the spine; let him hold out his hands in front, and notice, as he does so, that the shoulders are thrown backwards, and the spine becomes more arched forward in the loins. Such alteration of the

outline of the back is in excess in the weak child, as compared in one that is strong.

If the muscles which support the head and spine are not strongly energized, the head falls forward, and the spine becomes arched backwards; such conditions are best seen in the profile view, and give an appearance indicating powerlessness. Watch a man go to sleep in a chair; as the brain sends out less nerve force, the muscles of the spine become relaxed, the head falls forward on the chest, and the back bends.

That these conditions of ill-balance in the body concern your work as teachers is shown by the following facts:—Taking 100 boys and 100 girls, with each nerve-sign as given, we find the following numbers of pupils among them reported by the teachers as dull:—

	Boys.	Girls.
With the Hand weak balance ...	40	35
„ „ Nervous Hand	34	33
„ Finger Twitches	32	30
„ Bent Spine (Lordosis) ...	39	30

LECTURE IV.

THE HEAD, THE FACE, AND THE EYES.

THE head and face are parts of the body peculiarly characteristic of man, and here we see the greatest number of those signs which indicate to us the make of the individual and his condition. The head and face are also easily observed, and very interesting to study.

When studying expression in the head, as in other parts of the body, we must look to the conditions of its development, or size and form, and also to its movements and the postures which result from those movements. The title of Sir Charles Bell's first essay* is: "Of the Permanent Form of the Head and Face, in contradistinction to Expression." He goes on to say: "A face may be beautiful in sleep, and a statue without expression may be highly beautiful; on the other hand, expression may give charm to a face the most ordinary. Hence it appears that our inquiry divides itself into the permanent form of the head and face, and the motion of the features, or the expression." Bell uses the term "expression" as

* *Op. cit.*, p. 20.

confined to mobile modes of expression, and carefully distinguishes between them and conditions of development indicated by form.

It is convenient, for the purposes of description, to speak of three modes of movement of the head; *flexion* and *extension*, *i.e.*, bending forwards and backwards, as in nodding; *rotation* in a horizontal plane, the head remaining erect but the face turning to the right or the left side; *inclination*, *i.e.*, lowering one or other side of the head, so that the two ears are not on the same level and the eyes not in the same horizontal plane—inclination is said to be towards that side on which the ear is lowest. The only symmetrical movements of the head are those of nodding and bending back the head. In a strong and healthy child the head is held erect, unless something changes its posture. A slight sound may cause rotation of the head; a slight condition of weakness of the nerve-centres is indicated by drooping of the head.

If a child is seated at a table, properly hungry, bringing a plate of food towards him will, as soon as the plate comes within his view, cause rotation of his head towards the plate, and the food will be said to have attracted his attention. If, however, the child is in a very irritable, cross, peevish state of mind (brain), rotation of the head may occur away from the plate of food; it may be repelled by it, not attracted.

The lower jaw is the only part of the skull that can move separately from the rest; this bone is jointed on to the skull, it is depressed when the teeth are separated, and brought up again by the muscles when the

mouth is closed; the jaw can be moved both up and down, as well as laterally in mastication. The muscles which move the lower jaw are called the muscles of mastication; they are not supplied by the nerves which send motor power to the muscles of the face, but by a pair of nerves called the fifth nerves of the brain; this same pair of nerves has fibres which pass to its nerve-centre from all parts outside the head and face, and also from the membranes which cover the brain. Please remember that the nerve which moves the teeth is stimulated by impression on any part of the head, and also by the state of the membranes of the brain. This is the nerve which produces tooth-grinding in children. Tooth-grinding is very common at night, less common in the day; when it has often occurred, it leaves a flattened appearance of the tips of some of the teeth, and is a sign of irritability of brain in children. If I find such ground teeth, and am told that the child sleeps quietly and always well, I suspect it is the nurse who sleeps soundly, not the child.

A much worse sign with regard to movements of the jaw is when a child bites its playfellows; this is a very grave condition, and the meaning of it should always be inquired into, as it often indicates a very defective condition of the brain. Let me here remind you how frequently young puppies and kittens bite and gnaw, to our great inconvenience.

The head itself may have various positions or postures with regard to the trunk; these have been described and named when speaking of the move-

ments of the head. The posture, or balance, of the head may indicate the brain condition.

The simplest postures of the head are those called flexion and extension; they involve equal action of both sides of the brain. The weight of the head makes it fall forward if the muscles do not hold it up; hence, as fatigue comes, and passes on to sleep, the head may fall more and more forward till it is bowed on the breast. This bowed position of the head indicates something about the condition of the brain, but the posture is not solely caused by the brain action. Do not let children, when writing, bend much over their desks—the face should be as nearly vertical as may be, and, as far as possible, removed from the horizontal. You may notice the drooped head and the stooping and spiritless gait of a tired man, as compared with that of the same individual when rested and refreshed. The head is seen firmly upright in defiance, drooping in shame, and held on one side in nervous girls.

We have spoken of certain postures of the hand as being the opposite or antithesis of one another, and as representing opposite states of the nerve-system. We saw that the "nervous hand" was a posture the very opposite of that called the "energetic hand," and that these postures represent very different brain states; so, with regard to the head, flexion or drooping indicates conditions the opposite of those expressed by extension or throwing backwards of the head.

I have shown you that sight and sound may cause rotation of the head; extension, or bending up, of the

head often occurs apparently from other causes—in some states of emotion and excitement the head is seen to become extended, as when a child is excited by "æsthetic feeling." The observation of movements and postures of the head, in association with other signs, often gives much information.

Let me tell you of some conditions of brain disease in which the head is drawn backwards. This is commonly seen in cases of inflammation of the brain; also in infants during the brain irritation due to teething, when it may be accompanied by the convulsive posture of the hands, and precede an attack of convulsions. Now as to this posture of the head in healthy people: I have stood near a much-admired picture, and watched a crowd of visitors coming to look at it; in some the sight of such picture is followed by extension of the head, accompanied by upturning of the eyes to such a degree as to remove the picture from their field of vision. I cannot see the mind or feeling, but can see the extension of the head.

A considerable degree of extension of the head may sometimes be seen in children. I have seen it in a girl when repeating poetry, and it seemed to me to indicate an amount of excitement that should not be prolonged or often allowed. This posture is used in art to indicate intense admiration and ecstatic feeling; it is presented in some paintings of S. Cecilia.

There is a posture of the head indicating weakness of the nerve-system; you may see the head partially bent or flexed, and rotated and slightly inclined to the

same side; this is common in weak children—the head bends away from the weakest side.

We have spoken of the physiognomy of the head, and good and low-class types; we now proceed to describe the face and the features as an index of brain, telling you how it is working.

The face is that part which lies in front of the skull. If you could remove the skin of the face, and then the fat that lies beneath it, you would see the muscles passing in various directions. There is a circular muscle surrounding each of the openings of the face; such muscle, when contracting, closes the eyelids, or the mouth, as the case may be; there are other muscles which can open the eyelids, and widen the mouth. The muscles of the face are supplied with motor nerve-currents from the brain by a nerve called the facial.

Two pairs of muscles seen in the face are concerned in mastication, rather than with expression: these are called the masseters—they are situated about the angle of the jaw on either side; and the temporals, which are placed at the side of the head, in those parts called the temples. If you strongly clench your teeth, you will feel these muscles become hard as they contract and swell out. A schoolmaster knows these muscles, and when he sees them at work knows that the boy is eating, without asking the question. These muscles of mastication are supplied with nerve-currents from the brain by the fifth pair of nerves which we spoke of before.

All these structures which make up what is called

the face are supplied with blood-vessels, and the quantity of blood in them is also under brain control through a nerve called the sympathetic. When much blood rushes to the face, the child is said to blush; when the sympathetic nerve allows but little blood to pass into it, the face is pale; this mobile colour of the face is very expressive.

When we look at a human face we may observe its form, colour, and conditions of mobility. The general form and outline of the face is largely determined by the shape of the skull beneath. Either side of the face can move separately; hence the necessity of observing whether a facial expression is symmetrical.

To examine a face in detail, hold a sheet of paper in front of it, with one edge vertical and opposite the middle of the face; either half of the face can then be covered in turn, while the other half is examined.

Again, the face may be divided into three zones, or horizontal areas—the upper, middle, and lower. To observe each in turn, hold the sheet of paper with one margin horizontal, leaving the forehead above the eyebrows uncovered—this shows the upper zone; next view only that part of the face which is below the lower margin of the orbits, or sockets for the eyes, showing the mouth, the greater part of the cheeks, and the openings of the nose—this is the lower zone. Lastly, the middle zone may be demonstrated alone by holding the horizontal margin of one sheet of paper so as to cover all above the eyebrows, and another sheet so as to cover all below the orbits, thus leaving to view the eyebrows, the eyelids, and eyeballs, with the bridge of

the nose. By these methods you may readily examine the symmetry of a face, both as regards form and action, and you may also define the particular zone in which any mode of expression is seen.

There are some special movements in each of the facial zones worthy of notice. In the upper or frontal zone the movements are almost always symmetrical or equal on both sides; they may produce horizontal furrows, or vertical furrows with a drawing of the eyebrows together—the former is a movement not of an intellectual kind; the latter is often highly expressive of mental action.

In the middle zone the opening of the eyelids is usually equal on either side; we shall find that in this region we may have marked indications of exhaustion of brain action.

The parts in the lower zone about the mouth move in eating and in speaking. The mouth can be widened, its angles may be drawn upwards or downwards, and the upper lip may be raised at a point a little within the angle so as to uncover the canine tooth as in sneering. Widening of the mouth is seen in laughter, when the angles are drawn somewhat upwards, so also to a less degree in smiling. The circular muscle of the mouth contracts in closing the lips, and its action is excessive in pouting.

Examine a face showing signs of "mental anxiety." Making a physical examination of the expression by the methods suggested, we find it equal and similar on either side—therefore the expression is symmetrical. We see the signs of anxiety more when observing the

upper zone than when looking at the middle and lower parts of the face—hence the expression is symmetrical, and principally located in the forehead or upper zone.

The expression of mental anxiety may be contrasted with that of bodily suffering. Mental anxiety is expressed mainly in the upper zone of the face, by vertical furrows. In the facial expression of pain originating in the limbs or body, we see the signs mainly in the lower zone, the angles of the mouth being drawn down. In the face of a mother who has just lost her child, the mother's pain is shown by depression of the angles of the mouth; some years after the loss, when memory has idealized the child, reference to the sorrow causes the expression of mental pain in the forehead.

I have often seen a fixed expression of mental anxiety in young children, and, when questioning the parents showed no apparent cause, have in some cases gained the child's confidence and drawn out its story of "terrors in darkness," visions, or mental trouble, which the little child would not before speak of because it was not understood.

I know of only three forms of facial expression that are not symmetrical—snarling, winking, and one-sided grinning; certainly these asymmetrical expressions are neither intellectual nor beautiful. It is not uncommon to see awkward, silly movements in the faces of children—such as frequent frowning, and grinning on one or on both sides; such habits are not intellectual, and should be checked, if possible, in early life. They often depend upon causes which can be removed.

Fatigue and exhaustion are indicated in the face by a relaxed, toneless condition of the muscles and too little mobility or change of expression; the play of the features is lost, and the face falls or elongates slightly. A special sign of exhaustion is seen in those who have suffered habitually from recurrent headaches. It is not uncommon to observe that a child looks as if he had a headache. Analysing such faces, you may soon observe a look of depression, heaviness, fulness about the eyes, especially about the under eyelids; this sign is usually bilateral, and is due to a relaxed condition of the muscle (orbicularis) which surrounds the eyelids. If the patient can be made to laugh, the muscle becomes energized, and the expression of headache is lost for the moment. This sign is often best seen in the profile view.

If strong and unequal nerve-currents are sent to opposing muscles, a quivering or tremor of the part moved by the muscles may result. Such action is often seen about the muscles of the mouth under the influence of "conflicting emotions." Suppose a child has hurt his finger, but is trying hard not to cry: we shall see the muscles of the mouth quiver, until finally the effect of the injury to the finger acting upon the nerve-centres becomes the stronger force, the angles of the mouth are depressed, and the outbreak of sobbing follows.

The signs of the action of mind are seen in the face. Let me tell you a true story which illustrates this and some other things. An English merchant in China had lent a Chinaman money to trade with; a

sudden outbreak among the native population drove all Europeans from the settlement, and none of their property could be saved. Three days later this Chinaman came to the merchant, who had fled like the rest, and brought him his money in full. When asked why he had acted thus, knowing that the money could not be recovered from him by force, he replied: "Me no can spoil face." He would not have his face, the index to the action of mind, marked with the expression of dishonest thoughts and actions.

This story illustrates physiological fact; another use

FIG. 12.—PARALYSIS OF RIGHT SIDE OF FACE FROM BRAIN DISEASE.—The face is not symmetrical, and the muscles on the right side about the mouth act weakly. The line from the nose to the mouth on this side is almost lost: this is well seen on comparing the two sides. Muscular action in the upper and middle parts of the face is unequal on each side.

may be made of such knowledge in dealing with children. If by any means you can remove a bad expression from the face, you help to remove a bad condition or bad thoughts from the brain. Skilled actors know when they have brought the right expression to their face by the accompanying feeling, be it of anger or merriment. Do not let children play at making bad faces; when the face does not look right, try and change the brain condition; a good hearty laugh is often most useful in this way to the face, the mind, and the brain.

Looking at different types of faces, we are at once

FIG. 13.—PARALYSIS OF LEFT SIDE OF FACE FROM BRAIN DISEASE.—Similar differences are seen about the mouth. The eyelids are a little wider open on the left side.

struck with the fact that the passive appearance of some expresses intellectuality, while others are marked by inborn vulgarity, apart from any special mobile expression. Elements contributing to the low vulgar type are a narrow and receding forehead, a large prominent under-jaw, thick lips, and a thick immobile make of skin. Such signs are, however, empirical, and not to be trusted too far.

The condition of the nutrition of the tissues of the face is an important index to the general nutrition of the body and its different organs. A slight amount of malnutrition makes the face look dull; this may be due to too little blood circulating, or to partial absorption of fat from under the skin.

When we look at the face of an adult we see its inborn form, the signs of its present nutrition, the marks of all the mobile expression that has passed over it during the preceding years, and its present mobile condition as produced by the brain.

The eyes are considered among the most important features of the face. In conversational language, which is not always quite precise, the term "eye," as a feature of the face, is used somewhat loosely; but it is necessary, in our methods of study, to distinguish carefully between expression seen in the eyeball and expression in the parts that surround the eyeball—the eyelids, the eyebrow, &c. The eyeballs lie in their sockets, the orbits of the skull, resting among the fatty tissue which supports them. If that fat be diminished in quantity, the eyeball sinks farther into the orbit; if the fat becomes congested and swollen up, it protrudes

the eyeball somewhat. The movements of the eyeball are effected by small muscles attached to the eye and arising from the wall of the orbit; these small muscles are supplied by three different pairs of brain-nerves. The iris, or coloured portion of the eye, is a muscular curtain, with an aperture in its centre called the pupil, which may enlarge or contract. Light causes the pupil to contract; the pupil also contracts when the eye is looking at near objects, dilating when looking into the distance. A widely dilated pupil may indicate a state of mental excitement; it is contracted in sleep.

FIG. 14.—COMPLETE PARALYSIS OF THE RIGHT SIDE OF THE FACE.—The muscles of the face act only on the left side. In the forehead the frontal muscles produce horizontal furrows; the muscles about the mouth draw the left angle upwards; the eyelids are more widely separated on the right side.

The two eyes move together, so that, when one turns to the right, so does the other; or, when one eye turns upwards, they both turn up equally. In looking at near objects, say at ten inches from the face, the eyes turn slightly but equally towards one another.

Movements of the eyes are not equally common in all directions—more movements are horizontal than vertical; in turning the eyes to the right or left, there is no necessary movement of the eyelids; the eyes turn towards objects, their muscles being stimulated by brain-currents which are generated by the sight of objects around. In observing movements of the eyes, notice whether they are obviously guided by the sight or sound of objects around, or whether it be not so.

FIG. 15.—IMBECILE.—Head well shapen and of fair size; he often smiled, thus moving parts around the eyes and mouth.

Movements of the eyes not controlled as to their number and direction by obvious circumstances must be looked upon as signs of nervousness. Irregular movements of the eyes are common in children, and are very indicative of the brain condition; they may be looked upon as analogous to spontaneous twitchings of the fingers. In these wandering, irregular movements of the eyes we find an illustration of a common law, that excessive movement is often an indication of weakness, not of strength; the same thing is seen in the twitching movements of nervous children.

Movements of the eyes in the vertical direction are accompanied by movements of the upper eyelids, and very often the eyes and head move upwards together.

FIG. 16.—IMBECILE.—The same case quiescent; face wanting expression.

There are many modes of expression and abnormal nerve-signs that may be observed in the face: all good and healthy expression is symmetrical.

Defective expression.—Want of changefulness, vacancy, fixed expression — a face may show twitches or ill-action of the muscles such as will be described, and yet carry a good expression. In the forehead *frowning* may be produced, with horizontal creases which become deep if the muscles producing them overact strongly. This is a bad sign, and is most usual in children of unoccupied mind, often subsiding when the attention is attracted and the interest engaged. It is far more frequently seen in boys than in girls. Knitting the eyebrows, drawing the eyebrow together with vertical creases—this is often expressive of mental action, especially a puzzled mind.

Orbicularis Oculi relaxed.—There is a thin muscle which encircles the eyelids. Its tone gives sharpness to the lower lid, so that its convexity is seen. When this muscle is relaxed, there is a fulness or bagginess under the eyelids which disappears on laughter.

Eye movements.—When an object is moved at a distance two feet in front of the face, the eyes should move towards the object; in some children the head always turns towards the object, while the eyes are kept still in their orbits. In other cases fixation of the eyes is bad; there may be restless, uncontrolled movements of the eyes; the child's eyes may constantly turn towards your eyes instead of the object he is told to look at. Eye movements need training in the kindergarten. In the lower part of the face you

I may see *grinning* or *over-smiling*. This may be spontaneous, or may occur on any stimulation to effort. The lines thus formed in the face may be slight or deep. The mouth may be kept open; this may be from feebleness and drooping of the jaw. Many children are always mouth breathers, and cannot breathe through the nose on account of conditions of the throat requiring medical attention; in such children test the hearing, which is apt to become very dull if the case is neglected.

A few words must be said about squinting in children. When you see the eyes not turned in the same direction, this should at once attract your attention. A squint may be permanent, or it may come and go; in any case advice is required for the child. Such conditions often lead to headaches and worse conditions, but these may be prevented by the early use of appropriate glasses.

LECTURE V.

SIGNS OF GENERAL CONDITIONS OF THE BRAIN, AND EXPRESSION OF MIND.

THE most important condition of a child's brain is that indicated by the signs of consciousness. Something can be learnt by direct observation of children who are in possession of consciousness as contrasted with those asleep. You will find that the movements accompanying and indicating consciousness are such as are stimulated by circumstances around, by speaking to the child, or showing him things. If speaking to a child is followed by his running to you, or doing what you tell him to do, he is conscious. On the other hand, if you stand by his bedside while he is sound asleep and unconscious, you see general absence of all movements except those of breathing; speaking to him in a low voice, or putting pictures in front of him, does not make him move or speak. There may be some spontaneous movements of his limbs, but they are not controlled by things around—they are the mere outcome of spontaneous brain action, not of impressions produced upon it from

without at the time of observation. In healthy sleep the tone of the circular muscle of the eyelids is sufficient to keep them closed, but sometimes in weak children the lids are half open, showing a part of the white portion of the eye. We commonly say there may be different depths of sleep; sleep may be full and complete, with loss of most forms of impressionability. Observation of a child during sleep does not necessarily give us evidence as to whether there be any impressionability or not; it may be that the outcome or expression of impressions received is long delayed. Things said before a child when apparently asleep may not produce any visible result at the time, but we may subsequently learn that he had been impressionable to sound at the time of observation; the child may repeat what had been said before him. Here we know the impressionability by its effects in subsequent speech.

Fatigue is indicated by the slight amount of force expended in movement, and by the small number of movements. In the latter character we see some distinction between fatigue and irritability, in which condition there is often an excess of movement, and, in particular, an excess of speech. Fatigue and irritability often coexist. The free hand assumes the "straight extended posture with the thumb drooped," or the posture of the feeble hand. The head is often in an asymmetrical posture and flexed. The direct effects of gravity determine the position of the body to a greater extent than in the condition of strength; hence the spine is bent. If this condition tends to pass on

into sleep, it is expressed by the preponderance of the circular muscles over the elevator of the upper lid, and the other signs of sleep supervene.

Exhaustion is an extreme condition of fatigue in which movement is lessened. The face becomes toneless and devoid of fine mobile expression, the circular muscle of the eye is relaxed, the face may be lengthened from relaxation of its muscles and slight falling of the jaw; the ordinary movements of expression are not excited by the ordinary stimuli, and such movements as do occur are slow and laboured. A strong stimulus is required to induce the child to hold out his hands, and then the posture is the feeble hand. Sighing and yawning are common. Speech is slow, and the tone of the voice is altered. In some cases finger twitching, especially of separate fingers, indicates extreme exhaustion and irritability.

Irritability is expressed in a child when a slight noise makes him start; this is a reflex movement in excess, a reflex action that does not occur in perfect health on so slight a stimulus. In irritability other stimuli besides sound may produce excessive reflex action; a touch upon the shoulder causes a sudden movement. Not only is the amount of reflex movement excessive and out of proportion to the stimulus, but the kind of movement may differ from that usually following such a stimulus in health. A child three years of age, when irritable, may turn away his head from a familiar object, or from the sight of his food, and say "No, no"; here the sight of the object, instead of causing a reflex movement of the head, eyes, and

hands towards the object, moves all from it. The irritability of the nerve-centres is indicated by movements in the opposite direction from that which the same stimulus would produce in health. Besides these reflex signs we find the voice altered—when spoken to he may answer sharply; the motor force generally is lessened and irregular in kind; twitching, irregular movements are not uncommon. Nervous children often show marked signs of irritability; the spontaneous postures assumed are those of fatigue, with the addition of slight irregular twitching movements. If this condition lasts long, nutrition is lowered and wasting occurs. Abnormal conditions in the body, particularly in the stomach, may render the child irritable; so may fever or illness.

The *signs of nutrition* are of the highest importance and interest. The first point I wish to insist on is that nutrition may be expressed by (1) form or growth, and (2) by motion which is due to nutrition.

As evidence that motor signs, or movements and the results of movements, may express nutrition, let us examine a few examples.

(1.) In an ill-nourished infant spontaneous movement is much lessened, or the child may lie almost motionless instead of being constantly full of movement while awake. The return of spontaneous movement is a sign of the improved nutrition.

(2.) In a man after a severe illness, such as a fever, the tone of the voice is usually altered so that we can no longer recognise the individual by his voice; this motor sign, as well as the worn countenance, indicates

the man's lowered nutrition. Returning health is shown by the patient "looking like himself," and "recovering his old voice."

(3.) In a child seven years old emaciation and ill-nutrition, indicated by loss of weight, may be accompanied by St. Vitus' dance or finger twitching, which disappears when weight increases and nutrition is improved.

(4.) A strong, well-nourished man is less fidgety than a weak one.

Now as to the expression of nutrition by form and growth. Proportions of growth often indicate conditions of nutrition.

A seedling pea-plant, if kept in a room with deficient light, is not well-nourished, and the ill-nutrition is indicated by the small yellow leaves and the long white stem. That good nutrition has not occurred during the life of the plant is demonstrated by the fact that the plant, when dry, weighs less than the seed from which it grew. Here ill-nutrition is expressed by the relative growth of leaves and stem—the leaves being very small, the stem very long. In children we often see growth for a time occur in height without lateral development; then the proportions of growth change, and the child fattens.

Rest is probably a condition of nutrition leading to the signs of recreation indicated by subsequent activity. The most essential element in the expression of the condition rest is the subsequent activity. During rest there is still impressionability, which affords a distinguishing character between simple rest and sleep;

arising out of this we have the fact that in rest uncomplicated by sleep the eyelids usually remain open.

One of the special characters of rest is the absence of movement, although impressionability is retained. Rest is usually preceded by fatigue, and is followed by activity; the sequential signs of recreation and activity indicate that during the period in which movement was absent there was rest. Rest is expressed by the present signs of rest, followed by the signs of recreation and activity.

As a matter of interest it may be noted that forces, such as the sound of soothing music, may affect movements. Music may cause a man to keep quiet and rest.

In contradistinction to the state of rest we have activity. The condition of activity is indicated by actions. In activity with strength, the movements are probably fewer in number than in the state of irritability, and the kinds of movement differ in the two conditions.

One sign of healthy activity is a quick response of movement upon stimulation—for example, the movement follows quickly upon the sight of an object, or on hearing a sound. If such movements are looked upon as reflex actions, the quick and ready answer is a reflex series of movements where the period of latency is short; this of course implies also that impressionability is good.

What good, what advantage, is there in these special modes of describing what we see? Our modes of description are such as allow of comparisons being

made. We translate abstract qualities, such as "joy," into concrete terms, such as movements or conditions of form or development. We translate the terms used to describe the abstract property into other terms, the expression of the abstract. The term "happiness" is intended to indicate a certain condition of feeling which we all more or less understand. The thing happiness is an abstraction; but, if we can define an expression of happiness in man, we can deal with the material expression of happiness, analyse and study it.

Having these descriptions before us, we can make some comparisons or analogies. In laughter, which is an expression of joy, or happiness, the angles of the mouth are drawn upwards; this is the very opposite to the expression of physical suffering. By defining the expression of the abstract thing happiness in terms of motor signs, we find problems to deal with capable of physical investigation.

The most interesting signs of brain condition are those which indicate to us the action of mind. One method of determining the signs of mind is to compare subjects possessed of mind with others devoid of mind, or nearly so. It will be granted that an infant at birth does not show well-marked signs of mind. The principal signs of mind are absent. An infant at birth may be said to possess none of the actual faculties of mind, although it is healthy; it may possess potentialities, but it shows no actual present signs of mind. An idiot, in growing up from infancy, does not show those signs appropriate to his age

which indicate the functions of mind. The infant is said not to show actual signs of mind, though it may show potentialities; the infant at birth does not walk, talk, or turn its eyes and head towards a bright object within its field of vision—its movements are not modified in any marked degree by the action of light or sound, except that the eyelids contract spasmodically to light. The infant is, in some respects, less impressionable, and the impressions are less permanent than in the adult.

The signs of its brain development are identical with the signs of its mental development; we may proceed to recount them.

The healthy infant at birth weighs between 6 and 10 lbs.; its limbs and members are complete in all parts—fingers, toes, nails, &c.; the head measures in circumference 11 to 12 inches; the junctions of the bones of the vault of the skull are not closed or ossified, and the anterior fontanelle is open. We may also observe the form, size, and proportions of the body, and particularly of the head, as signs which indicate to some extent the degree and condition of brain development. Respiratory movements in the infant are established at birth, and continue without interruption; the child cries when its skin is cold or wet, and when the stomach has been empty more than two hours.

An object placed in the mouth stimulates the movements of sucking; cold to the skin is followed by crying; light causes closure of the eyelids; and, if the eyelids are raised, the pupil contracts to light.

Frequent spontaneous movements may be seen

while the infant is awake; movements, apparently irregular, are almost constant in the hands, fingers, and toes. A short period of wakefulness is usually followed by sleep, indicated by subsidence of movement in the limbs and closure of the eyelids. We say that the new-born infant does not give expression to the faculties of mind because it does not present signs showing that it is impressed, even temporarily, by the sight of surrounding objects; it does not move its hands towards objects within its field of vision, and no movements indicate that it is impressed thereby. Reflexes of sight and sound are almost entirely absent. The muscles of the face are seen to act earliest in the lower zone, those about the mouth causing expression before those on the forehead (corrugators), which seem to be specially connected with expression of mind.

Now, as to the child when four months old, we say that the attention is easily attracted because the sight of objects and sounds cause the head to be moved (by reflex action) towards the light or source of sound. More than this, after the stimulus of the sight of an object has caused the head and eyes to be turned towards the object, the further stimulation of the brain may arrest all movement; this often happens when the attention is attracted. On the other hand, the sight of an object, after it has caused the head and eyes to be turned towards it, may increase the amount of movement in the child.

Playfulness is probably the result of spontaneous movements, together with an increased susceptibility to reflex action. The "playful child" has a happy

face, owing to the healthy tone of the facial muscles and their nerve-centres.

The following observation in a child eighteen months old illustrates how the dawning intellectuality is indicated by the complication and fitness of certain sets of movements:—"The child, having both hands full of toys, desired to grasp a third; he then put the toy from one hand quickly between his knees, and thus set one hand free to take hold of the desired object."

The following kinds of movements as signs of a healthy infant brain deserve separate attention:—Movements following certain external agencies, light, sound. Movements the outcome of the essential (untrained) properties of the nerve-mechanism. Movements resulting from (training) the acquired association of nerve-centres. Movements similar to those previously occurring from a like cause, showing retentiveness. Movements in different areas, such as the small joints in contrast with large joints; or a different condition of movement of adjacent parts, such as the fingers. There may also be a symmetry of movements.

We may now give a description of a *nervous child* in terms of nerve-muscular action; and proportion of growth. A typical case may be found among children who sleep badly, talk at night, grind their teeth, emaciate without disease of organs—such children are apt to be irritable and passionate, and to suffer from headaches and hacking cough without lung disease.

Let such a child stand up, and observe him.

As to his conditions of growth: defects of proportional growth are commonly seen. The shape of

the bones, the make of the skin, the form of the features, may all be good. The height of the child in relation to circumference, or to his weight, is defective; the child is too tall and too thin; either fat or muscle may be defective in quantity. The emaciation may be unequally distributed; often it is less in the face than in the limbs and trunk.

Now as to the motor signs indicating the state of the nerve-system.

Let the hands be held out with the palms downwards, and the fingers separated. The left upper extremity is often at a lower level than the right; "the nervous hand" is seen on either side, perhaps more marked on the left; there may be finger twitching, separate digits moving in flexion and extension, or laterally in adductor and abductor movements. The spine is arched too forward in the loins, often with inequality in the level of the shoulders and slight lateral curvature. The face, as a whole, is usually too immobile, although there may be some over-action of the muscles widening the mouth, on one or on both sides. The tongue when protruded is too mobile. The eyes move mostly in the horizontal direction; their movements not being fully controlled by the sight and sounds of objects around, except under strong stimulation. The head is sometimes partially flexed, with inclination and slight rotation towards the same side.

Some of the teeth are usually found ground at their tips. This is most commonly the case with the canines; the grinding action is produced by the masticatory muscles during sleep, and is owing to irritation of the

fifth pair of brain nerves. We may here call to mind the fact that the sensory division of the fifth nerve is distributed to parts inside the skull as well as to those outside it.

Other examples might be given of defects in ratios of growth in the body coinciding with defects in the nerve-system; such coincidences are very common in idiots.

Speech is the most important mode of mental expression; it is a faculty that needs cultivation in all children. Indistinctness of speech is very common, and defects of speech are frequently met with, both in children generally healthy and well-made, and in others of defective constitution.

LECTURE VI.

OBSERVATION OF CHILDREN AND EDUCATION.

IN the preceding lectures I have explained to you how children may be studied, and have put before you methods which you may employ without asking questions or entering into any medical details. If you look back over what was said in the early lectures, you will find that we considered many signs of brain power in children, avoiding all questions of metaphysics. It seems to me very desirable, if not essential to the proper study of children, that we should judge by the signs which we observe, not by the answers to questions put to the child respecting his health. I seldom ask a child if he has headache, but often look for the signs of strength, or exhaustion, and the direct indications of headache. Such observations may be made by any one who is in personal contact with children, by the mother among her children, or the manager or teacher in the school. I was led to undertake these studies, and finally to put them before you, in the hope and belief that children may be benefited thereby through you.

The care of children and the improvement of

methods of education concern us all alike, and through many years I have had abundant evidence that there is great need for exact knowledge as to the condition of children in the home and in the school. It is right that we should all learn to study children in a scientific manner, that we may know how best to aid their development in mind and body and take our part in causing them to grow up as healthy, good, useful men and women. The care of children of all classes is a very responsible work, demanding intelligent and earnest care; it is not enough for teachers to study methods of education and school practice, the subjects to be taught, and the methods of teaching them. Some knowledge of physiology is very useful, but it is a direct duty to *study the children themselves*, that we may know their individual tendencies, and that their ever-varying condition may be at once perceived. We should see the signs of fatigue before exhaustion and irritability are obvious in imperfect lessons and bad behaviour; hence the necessity for an intelligent and precise knowledge of children, enabling us to detect early the signs of failure of strength.

On going into a school to study and note the condition of the children, it is my custom first to observe each child while the lesson continues. If the light in the schoolroom be good, there is no difficulty in noting such points as the size and general conformation of the body and the head, and looking at the separate features of the face, the signs of nutrition, and the apparent age of the child. Then, in the second place, having requested the teacher to ask the children to stand up

and hold out their hands, I notice the postures of the body, the head and the spine, the arms and the hands, as well as the movements of these parts. The signs visible in the face and eyes can be seen at the same time; these have all been described in preceding lectures. Judging from the various signs thus seen, and without asking questions or speaking to the children of our purposes, it is easy to report upon them thus:

1. As to their development, whether good-class or low-class.

2. As to the present state of their nutrition, both of body and brain.

3. As to the present condition of the nerve-system, including such points as its probable healthiness, weakness, exhaustion, the signs of headaches, or slight St. Vitus' dance (chorea). Dulness of the nerve-system, together with other signs of born imperfections or defects, is formidable from the point of view of further success, and should always attract attention and stimulate the teacher's energy.

Can this knowledge be made of use? The good of the children is the motor power by which we work, and those who acquire the most knowledge of children will, in the end, acquire power and success in education, despite any temporary difficulties.

Let me give a few practical examples. At a Board school I visited the sixth standard girls in company with some friends, and requested the teacher to point out, unknown to the children, those who gave the most trouble. Among them were two small but well-made children—the nerve-system in each was

exhausted; had this been known on authority by the managers, might not these children have been exempted from examination, and the teacher from the necessity to press them on, though still requiring their attendance at school?

In a high-class school, a boy presented a general good development, but his nerve-system was exhausted; he had far too much movement, showing brain irritability. The master said he worked well, but his father often wrote letters to the school expressing his desire that the lad might do more work, and move up in the school quickly; the headmaster wished the same. Here is a case where knowledge of a precise kind, possessed by the master of the class, would necessarily put power in his hands to act for the boy's real good. On the other hand, where development is slightly defective, but nutrition good, it is for the child's benefit that he should not be excused from due work, except when knowledge shows that the work is harmful. Regular and appropriate work is essential to due brain development and healthy growth.

Looking over the classes of a well-arranged large primary school, and comparing the condition of the children with that of those of all ages who had only recently commenced school attendance, I have been struck with the marked improvement of the nerve-system which seems to occur under good education.

Many statements have been made, both here and in other countries, as to the present condition of children in the primary and higher schools, and some not

unreasonable anxiety has been raised in the public mind in this matter. It seems to me that it is highly desirable to separate the question of the actual condition of the children from the probable causes of any defects which may be found to be common among them; we should endeavour to determine the two questions, the actual condition and its causation: the latter is a very complex question. As far as I am able to express any opinion from my own observations in Board schools in London and elsewhere, I think that probably about six per cent. or more of the children show defects or exhaustion of the nerve-system, and the number of cases of eye defects appears to be large.

It is very desirable to obtain some certain knowledge as to the average condition of the children in our primary schools, and this can only be done by direct observation of the children, independent of questions asked. Statements should not be dependent upon the answers to questions put to parents or teachers, and the signs to be observed must be clearly defined and scheduled. It is generally acknowledged that children are not all alike, they are not all cast in the same mould; but, before children can be classified as to their make and their condition, we must have precise knowledge as to what is to be observed, and how to proceed in the matter. In these lectures I have endeavoured to give such knowledge.

A knowledge of children concerns us all in the discharge of our duties, whether they be those of the parent, the teacher, or the school manager. The child is sent to school to be submitted to the beneficent

influences of education. We will not attempt here to define what is meant by the term education, but we mean those processes which are designed not only for giving knowledge; but, further, to draw out and organize all the latent powers of the child, that he may become good, active, and intelligent, as well as be possessed of learning.

Parents have often consulted me as to whether a delicate child may, with advantage, enter upon or continue school life, or, with regard to older boys, whether they may with safety prepare for competitive examinations and submit to the strains involved thereby. When the development and nutrition are good, and when no signs of exhaustion are seen, I always advise that the effort be made, but the child should be watched while undergoing any prolonged strain from hard work. Many an effort may be wisely allowed when those around are capable of watching the effects.

Again, to give practical illustration. It is common in Board schools to find in the lowest standard children of defective make, trying to the teacher no doubt, little boys and girls whose make and inherited conditions cause them to tend to badness rather than to learn to be good. Such children, if known to the managers, might be specially commended to the teacher's care, and honour and reward should be given to the teacher who honestly and laboriously tries to benefit them. Such boys and girls could not be expected to pass the successive standards, but they should be kept in some school for their own good and

the public good. Knowledge as to the physical condition of children is necessary to distinguish those slightly defective from those merely stupid and lazy, who ought to be made to work and not exempted or spared from punishment. On the subject of the eye conditions of children I say nothing; facts have been ably put together by Mr. Brudenell Carter, Mr. Priestley Smith, and others. It only remains for me to say on that subject that eye defects are common sources of headache in school-children.

I do not hesitate to urge the importance of appreciating the physical condition of our children, for it is among the slightly wrong-headed children that we have a large proportion of our future men and women who will prove social failures, paupers, and criminals. Let us then pick out and save such children, not necessarily making the teacher press them through successive standards, but holding him in honour and in duty bound to cultivate them, and strictly to require their continued attendance at school, if practicable, as the only hope of their moral and social welfare.

The blind and the dumb are now specially cared for; so should those children be who are weak or born a little wrong-headed, and, for similar reasons, it is their right and to the public advantage.

While thus endeavouring to impress my own opinions and estimate of the value of knowledge as to the physical condition of school-children, I am very desirous of gaining information from managers and teachers, in order that we may all work together with a common object, with unity of purpose, liberality

where we differ or see differently, and in a spirit of charity to all.

A knowledge of the signs of the condition of the brain will also be useful to school managers in their supervision of the younger teachers. I have seen a young woman, who presented the complete type of nervous exhaustion, standing before her class, truly an object for sympathy, but a bad impression must have been produced thereby upon the little ones.

Let me present to you a report of what was seen at a high-class school I was invited to visit.

Third class, seen 1885. Twenty-nine boys present at a lecture on geometry, 2.30 o'clock.

No questions were asked, and the lesson proceeded as usual. I observed the boys during the lecture, first from the master's desk, afterwards from a side table so as to get a good profile view.

This group of boys appeared generally healthy and well. As I looked at each boy at his desk, eight of them attracted my attention :—

A, B.—Two used spectacles.

C, D.—Two did not use spectacles, but appeared to be short-sighted.

E, F.—Two showed some developmental defects.

G, H.—Two appeared somewhat exhausted in the nerve-system, and are likely to be subject to headaches; this is probably not a temporary condition.

No detailed examination of individual boys was made, but the grounds of the opinion given in the cases of E, F and G, H may be stated. E, F showed

no signs of brain-exhaustion or of headaches. The following signs of defective development are probably of long standing, or from birth.

E. One of the biggest boys in the class; he must weigh heavy, and speaks with a loud voice. As signs of defective development, I observed that the ears were ill-shapen, the head too round in form, and wanting in characteristic points. As a sign of defect (probably permanent) in the nerve-system, there was excessive and coarse action of the muscles in the forehead, causing horizontal and vertical furrows. Evidence that he was not exhausted was seen in the symmetry of nerve-muscular action on the two sides of the body. It was observed that the over muscular action of the face lessened as the lecture proceeded. He lost places in class.

F. A small boy with a badly shapen head, though it was not small; this may have been due to rickets in early life. As to the nerve-system, he was too mobile, and there was a little over-action of the frontal muscles. He was distinctly fidgety, or playful, and lost places in class.

G. A boy of fair complexion, with light hair, rather under the average size, but placed second in the class. The following signs of nerve-exhaustion were seen:— Too little general mobility in the limbs and in the mobile features of the face, producing a dull expression; in the forehead, however, there were fine horizontal lines, or furrows, due to recurrent over-action of the frontal muscles. A further sign of exhaustion and probable liability to headaches was observed in

marked fulness under the eyes, due to relaxation in the circular muscles. No signs of developmental defects were apparent.

H. A boy of fair complexion, with light hair, placed 24th in the class; he lost places. The signs of nerve-exhaustion were:—Over-mobility; the arms were several times thrown about, often with the left hand clenched; he was decidedly fidgety. There was fulness under each eye, indicating that probably he is a sufferer from headaches. In addition, a slight sign of developmental defect was seen—the left ear was ill-formed.

Examples might easily be multiplied.

Teachers have said that exhaustion in children is often due more to mismanagement at home rather than to work in school. That may be so in some instances. Let me sketch a case for you. A girl, twelve years old, comes to school in the morning with too little spontaneous movement, the head is not held erect, the face is pale, the muscles around the eyes are relaxed, the eyes are wandering and not fixed or controlled in their movements by sights and sounds, the free hand is in the feeble posture. The attention is not readily fixed, she is fidgety and restless; such signs indicate exhaustion and irritability. We assume that the school is well arranged, and the work suitable. Later in the morning the child brightens up and works better, so that at the close of morning lessons she appears in better condition than when she came under school influences. Now, if the teacher knows, from questions put, or other sources of information, that it

is not the school work that produces exhaustion and depression, should the matter end there? If the teacher's opinion is founded on *facts* observed, would not any reasonable loving parent allow a friendly remonstrance or suggestion? If such conditions continue in the child, may she not exert a harmful moral influence in the school, such as may justify a stronger remark on the part of the school manager? Still, it cannot be expected that parents will readily listen to vague reports of their children, or to such as are not founded on precise and definite grounds.

We have a system of public education supported by the ratepayers, which is presumably undertaken for the benefit of the children and the benefit of the public. The educational processes are arranged for average children; are they adapted to all children? The deaf and the blind children are now in part provided for in special class-rooms. I desire to draw attention to another class — the nervous, irritable children; children who are irregular in school attendance on account of frequent headaches, chorea, occasional fits, habitual truants whose brain defect can be proven; children so dull that they remain among the infants and learn nothing but to be good. As a hospital physician I meet with many such children; doubtless they form but a small percentage of the school population, but they form a social danger.

Why are the deaf and the blind educated? A part of the reason is that they may not become paupers. Why, then, are the children of slight brain defect not specially cared for, children tending to become

passionate, picking up bad habits and practising them, tending to criminality, or, if too feeble for that, to pauperism? They are not neglected intentionally, but because they are not known to the managers; it is nobody's business to find them out; they are not classified, and take their chance. Now my argument is, that we can discover such children, and pick them out in a school by definite physical signs; we can point out the children not up to the average, and tending to failure from want of brain power.

To say that such children are few in every school is no reason for their neglect; we rejoice that but few have such inborn conditions as make them tend to social failure, pauperism, or crime, but we wish that none should thus fail. Let the tendencies of children be detected early and pointed out to the educationalist, that such children may be specially cared for, helping to correct the tendencies due to defects of brain.

Neglect in these matters does lead to unintentional cruelty to children, and to, what I think more important, *the educational neglect of wrong-brained children.* This is due to ignorance, for which the public and the school managers are responsible.

Now, as to these wrong-brained children, they are worth helping: in many ways a genius differs from ordinary children; the very faults and nervousness may be trained to become admirable qualities—sensitiveness and mobility of mind—and the fidgety child may become an active man. It is to be feared, however, that too often such children escape, and are excused from an educational process unsuited to them, but

still better than no education, for such children more especially need the benefits of a wise training. The nervous, excitable boy, always ill with sick headaches while at school, is excused from attendance, and at home he is idle; we often see him at the hospital. Too often the parents are neglectful and unwise, and as he grows up, when drink or passion inflames him, he commits some act bringing him within the power of the police. I have seen the education of many such children continued with success when they are removed from large schools and placed at small schools. Again, the weak-brained, feeble-minded child is often so teased that at last he cannot be induced to go to school; his attendance is excused on the ground of health. What becomes of him after that? Habitual truants have often been brought to me at the hospital; the defective condition may be obvious. The fine is paid by the father, but this does not educate the child; the mother often wishes that Johnny would go to school and be a good boy, but the school is unsuited to him, and she cannot help it.

We say that these wrong-headed children can easily be pointed out to school managers, and can be educated in special classes in day schools. At a school inspection it would be easy to see who required special care; the teachers would present for examination any child found specially troublesome, often complaining, very passionate, morally defective, &c.; and the cases of children excused attendance on grounds of health would be considered; advice might be given on all such cases to the managers. I was recently consulted

about a little girl who suddenly developed a tendency to steal; she had heart disease and a tendency to rheumatism; six weeks' care made her all right again, and removed the causes of moral obliquity; she was not called a sinner, and was sent to school again as a happy, good child; she will be watched, and will probably do very well. At a school a child was presented by the teacher as "not dull but somehow wrong"; grave brain defect was obvious; the advice was given to keep the child, if possible, at school and out of the gutters.

In classes for the dumb children at a London Board school I have seen children very defective in brain being well trained; in the highest classes of asylums for imbeciles, feeble-minded children are educated and sent out into the world. Small classes and specially trained teachers might be provided for the dull, the excitable, the wrongly-made children, as a safety and protection to society.

As to the expense of teaching a few children, say fifteen in a thousand, in a special class-room, would not the money be well spent in an effort to lessen crime, pauperism, and social failure at its commencement? Should the endeavour be made to educate and save the child, or to reform the drunkard and criminal, and redeem the pauper to society?

When a teacher takes special pains to keep a feeble child in school, and save and train him, even if he cannot pass the standards, that teacher should be honoured and commended. Every weakly or troublesome child who now escapes from public education is

a failure in the system, and is likely to be a public loss. The brain can be improved by education, and tends to degenerate when neglected.

The work I plead for is heavy to undertake and carry through, but it is not impossible: all should help by studying the children earnestly and patiently; then the best methods of management and classified training would soon be known and applied for our common good.

To seek to gain knowledge and to diffuse it is worth an effort, and requires combination of efforts. Will those responsible for the care of children tell us how we can help them in their grave responsibilities?

Briefly to sum up. Let us learn to observe children that we may know the make of them and their condition. Let us find out what to observe as signs of their make and their condition. When we have learnt to observe the condition of children, let us study how best to aid their development and improvement in mind and in body, for the two must go together if we wish for good and healthy children growing into good, useful, well-toned men and women.

CONCLUDING CHAPTER.

SINCE the publication of these Lectures in 1887, much has been accomplished in advancing child-study in a systematic manner. A Committee was formed in 1888 with the object of describing each child seen in school in any way below the average in mental or physical status, by means of signs indicating conditions below the normal, combined with the teacher's report of each child as to ability in school work; the lines of observation adopted were those indicated in these lectures. The work has been continued ever since the formation of that Committee, and a report has been issued based on the records of 100,000 children seen in 168 schools, whom I examined in conjunction with other medical men who corrected or confirmed the records taken. That report contains a catalogue of groups of children described according to what was seen in them and the teacher's report; and shows their relative distribution under sex, age, position in school standards, nationality, and circumstances.

As an experimental endeavour to carry out the original object this work may now be considered complete, so far as it is a demonstration of its practicability and usefulness, both as affording new information on many conditions of childhood, and as indicating the needs of individual children.

Of the children seen, 7·8 per cent. of the boys and 6·8 per cent. of the girls were reported by the teachers as dull, backward, or below the average; but, of the children who presented none of the signs previously indicated in these lectures, only 1·25 per cent. were reported as dull. This fact shows the marked association of mental dulness with the points of defect described, and the importance of getting a child's brain in good working order as a means of cultivating mental ability and building up child-character. Again, of the total number of dull children, 57 per cent. of the boys and 52 per cent. of the girls presented some of the "nerve-signs" which it has been shown can mostly be removed by good physical training. These nerve-signs, whether alone or in combination with other defects, indicate brain conditions which are the most potent causes of mental dulness; and, where they are very frequent in a school, the proportion of dull pupils has been found high.

There is a group of *dull and delicate children* with abnormal nerve-signs, whose condition appears to demand that they should receive special attention; the physical report and indications of mental dulness agreeing to indicate them as unable to profit by the ordinary modes of training suited to the average and stronger children, who, at the same time, require more than ordinary care to prevent their failure in adult life.

Evidence, from the early portion of this inquiry, was given in 1889 before the Royal Commission on the Blind, Dumb, &c., and, for the first time, it was

officially recognised that there is a class of children who, while not imbecile, present a certain amount of mental deficiency.

The Commission reported :—"That, with regard to 'feeble-minded' children, they should be separated from ordinary scholars in public elementary schools, in order that they may receive special instruction, and that the attention of school authorities be particularly directed towards this object."

Children Feebly-gifted Mentally.—"These children are distinctly deficient in mental power, but might not be certified as imbeciles, and are therefore not fit for such medical certification. No child was included in this group, unless it was believed, upon evidence observed and the teacher's report combined, to be incapable of school work in the ordinary classes. It is difficult to define what physical conditions seen, as apart from mental tests, indicate the child as unfitted in mental capacity for the usual methods of education, and an arbitrary attempt to do so has not been made. There appears, however, to be a large class of 'children feebly-gifted mentally,' with defect of mental power short of imbecility, but still with some deficiency. I have made the estimate that the probable number of such children in England is not less than one per cent."

Children who appear to require Special Care and Training.—This group includes those described above as dull and delicate, as well as the children feebly-gifted, and, in addition, cripples and epileptic; making in all about 15 per 1,000 of the children of school age, all of whom appear to require special care on

account of physical or mental infirmities. This estimate does not include the blind or the dumb.

Report upon the children in a school indicates at once the character of the average material submitted to the teacher, which differs considerably in some schools. In an Edinburgh school the proportion of children with defects in development of the body was lower than in London Board schools, but the proportion of dull pupils and those with "nerve-signs" was higher; apparently this was due to the absence of any attempt at physical training in the Edinburgh school.

Again, it appears that the teachers in the Poor Law district schools have more difficult work than in the elementary day schools. Taking 100 children in each class of schools for comparison, we find in the Poor Law schools 15 boys and 12 girls with developmental defects and 15 boys and 10 girls with "nerve-signs," as against 12 boys and 9 girls with developmental defects and 11 boys and 8 girls with "nerve-signs" in the day schools.

In some schools of special difficulty the proportion of children not up to the average in physical and brain status was considerably above the average.

The Brighton School Board, following upon the report which I made upon a thousand children in a selected school, appointed a special teacher to a small class of "feebly-gifted children." The London Board were the first to institute classes of special instruction for such children, and Birmingham, Leicester, Bradford, and Bristol have taken similar action.

The work of conducting such "special classes"

must be laborious; but it is likely to prove very interesting, presenting many distinct educational problems which are quite apart from the ordinary work of the school-room. Following a suggestion made by the Committee who conducted the inquiry to the Education Department, the Rev. T. W. Sharpe, Senior Chief Inspector of the Department, was, at their request, present at the inspection of some of the schools, and expressed his favourable opinion as to the usefulness of the investigation, and a wish that teachers might learn something of the methods of observing children for the purpose of classifying them. A letter was addressed by the Committee to the Universities, colleges, and other educational bodies, suggesting the desirability of establishing lectures on the study of children.

In the report children are classed in groups according to their bodily condition or health, brain action, and status in school.

Children with Developmental Defects.—Such cases are more frequent among boys than girls; the conditions of body observed may have no further significance; but, in many cases, other defective conditions are associated. Taking 100 boys and 100 girls with such defects as are described, we find:—

In children seven years and under: 23 boys, 35 girls also pale, thin, delicate; 36 boys and 40 girls being dull pupils.

In children eight to ten years old: 16 boys, 22 girls are delicate; while 41 boys and 46 girls were reported as dull in school.

In children eleven years old and over: 7 boys and 15 girls were delicate, whilst 37 boys and 51 girls were reported as dull.

Conditions of health may improve as these children grow older; but an increasing proportion of them are found by the teacher to be dull pupils. To prevent such mental dulness occurring these children should be recognised early in life, that they may be trained appropriately from the first.

Children with Abnormal Nerve-signs.—Taking 100 boys and 100 girls with such signs as described, we find:—

In children seven years and under: 19 boys, 27 girls also delicate; 43 boys, 47 girls being reported as dull.

In children eight to ten years old: 11 boys, 15 girls also delicate; 42 boys, 41 girls being dull pupils.

In children eleven years and over: 3 boys, 5 girls also delicate; 25 boys, 26 girls being dull pupils.

Children, thin, pale, delicate.—Such cases are more frequent among girls than boys when we take the whole number of children in a school; when, however, we take only well-made boys and girls, excluding those with developmental defects, the proportion of delicate boys and girls is about equal. This fact may be important in considering questions of school method and arrangements.

Taking 100 boys and 100 girls, all delicate children, in school, we find:—

In children seven years and under: 52 boys, 66 girls also presented some signs of defect in develop-

ment of the body; 41 boys, 36 girls showed "nerve-signs"; whilst 43 boys and 43 girls were dull.

In children eight to ten years old: 51 boys and 50 girls presented defects of development, 51 boys and 51 girls showed nerve-signs; 49 boys and 40 girls were dull.

In children eleven years and over: 39 boys and 35 girls had development defects, 56 boys and 50 girls showed "nerve-signs," while 37 of the boys and 35 girls were dull.

Delicate children are often dull and need training and teaching, as well as physical care in other directions.

Dull and Backward Children.—Taking 100 dull boys and 100 dull girls, we find:—

In children seven years and under: 45 boys, 55 girls have developmental defects; 49 boys, 44 girls have nerve-signs; 23 boys and 30 girls are delicate. Note the large proportion of young dull girls that are also delicate.

In children eight to ten years old: 43 boys, 42 girls have developmental defects; 63 boys, 56 girls show nerve-signs; 14 boys and 16 girls are delicate.

In children eleven years and over: 38 boys, 35 girls have developmental defects; 59 boys, 56 girls present "nerve-signs"; and 7 boys and 10 girls are delicate.

These facts concerning the common association of defects afford explanation why children are seen so differently from different points of view, by the earnest teacher and the equally well meaning parent. The

teacher finds the child dull and backward; the mother sees the "nerve-signs" and indications of delicacy. A scientific description of the facts seen indicates both points of view.

It has been said that girls are more delicate than boys; inquiry and accurate description show that probably there is not more delicacy among perfectly well made girls than boys; when, however, girls are constitutionally weak they tend more to further conditions of disturbance and disorder in greater proportion than the boys.

It has been shown that there are children to be seen in the schools below the average in physical and mental power of all grades; how does such knowledge bear upon school organization and education?

The scientific observation of children has other advantages than the development of methods of public education; from the careful study of recorded observations we may improve the basis for research in physiological psychology.

All outward expression of mental states and mental action is by visible movements and results of movement; it is possible then, by analysis of such modes of expression, to determine something of the modes of brain action corresponding to mental states.

In sleep, or a state of healthy unconsciousness, we see that no movement is occurring in the limbs; the pupils are small; the movements of breathing are quiet and uniform; low sounds do not produce action or any subsequent expression. After such full deep sleep we see many spontaneous movements. We

conclude, then, that sleep is a physiological condition in which the brain does not receive stimulation from the outside; that its tissue is simply living and growing in healthy manner, and storing up healthy force which we see displayed in spontaneous movements after sleep.

Contrast this brain state with that seen in a storm of passion. Bain says ("Mental and Moral Science," 1872, page 261): "The physical manifestations of anger, over and above the embodiment of the antecedent pain, are (1) general excitement; (2) an outburst of activity; (3) deranged organic functions; (4) a characteristic expression and attitude of body; and (5), in the completed act of revenge, a burst of exultation." Sir Charles Bell (*op. cit.*, page 77) gives the following description:—"In rage the features are unsteady. The eyeballs are seen largely; they roll and are inflamed. The front is alternately knit and raised in furrows by the motion of the eyebrows; the nostrils are inflated to the utmost; the lips are swelled, and, being drawn by the muscles, open the corners of the mouth. The whole visage is sometimes pale, sometimes turgid, dark, and almost livid; the words are delivered strongly through the fixed teeth; the hair is fixed on end like one distracted, and every joint should seem to curse and ban."

At the commencement of an attack of rage there may be momentary paleness: this is the best time for a chance of quieting the child. Then the breathing is seen to be quickened and the face flushes; the breathing is embarrassed, and the veins in forehead,

face, and neck swell out in consequence, while the lips are swollen and prominent. The eyes may move much, not being under control; while the hands are opened and closed and gesticulate, and the lips may be seen to twitch at the angles of the mouth. The storm of movement may spread to muscles moving the larger joints of the limbs, the elbows, shoulders, and knees, as seen in biting and stamping. The order of occurrence of the signs is then pallor, then flushing, and congestion of face from impeded breathing; this is the order of events most common in an epileptic fit. These movements are first in small parts, afterwards in larger parts of the body. All this indicates a spreading area of brain in strong action, sending out force to the muscles; such brain action not being under any kind of control from without. The exhaustion that follows corresponds with the large area of brain that has been discharging motor energy, and wasting it. Here, as in other cases, a brain not well under control wastes energy which good guidance might have saved; good training is an economy of force to all, and specially in the weak.

A spreading area of brain in over-action is seen in stammering; here the spasm accompanying and causing the defect of speech may be seen to commence in the muscles of the face about the angles of the mouth, in depression of the lower jaw, or in knitting of the eyebrows. Then the tongue is thrown into spasm, and, it may be, the muscles of respiration as well. The march of the spasm should be noticed; it usually recurs in the same order. On the first

indication of visible spasm, which usually precedes the sound of the stammer, the child should be stopped in his effort to speak. Most of the children who stammer are boys.

A spreading area of movement may be healthy, as the resumption of spontaneity of action all over when children are let out to play; but such usually removes for the time the previous order or method of mental action. Laughter is another example of spreading area of motor brain action; and it is apt to remove a line of thought. Could you induce the expression of joy and laughter in the boy in the first stage of anger—say by imitation of you or of the other children—much might be done to improve his mental status.

Translation of mental states from teacher to pupil is largely effected by imitation of the visible expression seen in the teacher by the pupil. The appearance of strength, fatigue, or quiet mental attention in the teacher is imitated by the children, thus placing their brains in a similar attitude. Truly, the study of physiology does not lessen our moral resposibilities.

There is one item in imitation I wish to draw attention to. After telling the child to do as you do, raise your right hand: probably the child will raise his left, which is opposite to your right, in place of doing as you do; I believe such mode of copying should be checked as being inaccurate. The principle of imitation extends to the smallest details; in teaching speech the pupil should look fixedly at the movements of the teacher's mouth, and imitate them as well as the sounds produced. To bring about such accurate

imitation it is necessary to cultivate in the child the habit of fixing the eyes on the object he is told to look at.

I think it must be evident from what has been said that, in many instances, it is quite possible to observe the motor signs expressing mental states, and to deduce therefrom the modes of brain action corresponding to such mental attitudes. I have not space to follow out this subject here. If you succeed by your personal skill in improving the expression of the child in his movement and action, you have succeeded, to some extent at least, in improving his brain, removing its disorderliness, increasing thereby mental and moral aptitude.

I have often wished help from teachers in regard to children in whom twitchings, ill-balance, slowness or response, want of due movement or fixation of the eyes, awkward action, or other "abnormal nerve-signs," indicated "brain disorderliness."

Training adapted to such purpose differs from many of the modes of physical training commonly employed in schools. To improve the action of the child's brain by physical exercises he should be trained rather by his sight in imitation of the teacher's movements than by drill conducted by the word of command or by music. Marching and exercises with dumb-bells, poles or clubs, as well as with the closed fists, are very useful means of increasing muscular power and improving the chest. To co-ordinate or regulate the brain by physical training, "free exercises" are needed. There should be nothing in the hands as they move

simply under guidance of the brain and directed by sight of the teacher's movements; as far as possible the fingers should be separated or open. With the hands held out in front, each on a level with the shoulder, and the distance of the body apart, make movements of the fingers in regular order, such as those performed in playing the piano—regular in time and in degree of movement.

Eye movements need training; many children and some adults look towards an object by turning the head in place of moving the eyes in their sockets.

It is shown by the Census that 24 out of every 100 persons living are children of school age. This shows the magnitude of the work of public education; its results during the past twenty-five years are indicated in a diminution of the numbers of paupers and of the criminal classes. The effects of education having been shown to be beneficent, it is important that all children should be brought under its influence; it has, however, been shown that some groups of children cannot profit by the ordinary methods of instruction, but require special training adapted to their special needs.

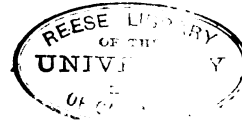
In some schools the dull and backward children of various ages are accumulated as Primers or in a Standard 0, which mostly contains the children too old for the infant school and too backward for Standard I.; or in a class where older children who are dull are accumulated higher up in the school. In such classes the arrangements, the number of pupils in each class, and the selection of the teacher, should

be adapted to the special difficulties of dealing with those children whom it has been shown particularly need careful and individual attention.

It is shown in the Report of the Education Department for England that there were on the registers of infant schools: aged eight to nine, 28,839; aged nine to ten, 5,331; aged ten to eleven, 2,185 children.

The most important preparation for dealing with children and building up their character is to know child-nature; and, in dealing with children in any way exceptional, it is equally necessary to know the individual child as an object of study. For this purpose special practical and theoretical instruction is needed in training colleges and elsewhere as to the indications of the brain condition of children—their mental aptitude, weaknesses, and peculiarities. The teacher should be enabled to give a description of the children in a class, indicating the condition of each pupil as a basis for school classification.

I hope that what has been said in the preceding pages may be useful, and afford assistance and encouragement to many in pursuing an interesting study of child-life with the object of developing the character of each child.



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